



The **Communicator**

May - June 2026

50 years of expertise bridging RF passion with essential public safety response

The Bi-monthly Journal of Surrey Amateur Radio Communications



QSK?

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...from the Editor's Shack



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Our article reprint policy is on [page 105](#)

Issues appear bi-monthly, on odd-numbered months, for area Amateur Radio operators and beyond, to enhance the exchange of information and to promote amateur radio activity.

Submissions of articles and photos are welcome.

During non-publication months we encourage you to visit the Digital Communicator at ve7sar.blogspot.ca, which includes recent news, past issues of The Communicator, our history, photos, videos and other information.

To subscribe, unsubscribe or change your address for e-mail delivery of this electronic journal, notify communicator@ve7sar.net

If you find The Communicator worthwhile, regular readers who are not SARC members are invited to join our club or contribute a [donation](#) towards our Field Day fund via [PayPal](#) or via eTransfer to payments@ve7sar.net

SARC maintains a website at www.ve7sar.net

A few busy weeks and months ahead! Our preparations for Field Day are progressing and, for the first time since COVID we will be setting up in the outdoors at a new site. A local model RC Flying Club has graciously permitted us to use their field and facilities. It will be a new experience for many of our members given the number of new hams who have joined SARC. A report and photos are sure to follow in the July-August issue.

For SARC members this issue will include a supplement for our Annual General Meeting. It is an opportunity to reflect on past year activities and accomplishments, and plan for the coming year. There will also be an election for SARC Directors for the coming term. We have 8 Directors, 4 of whom are elected each year for a 2-year term. After more than 20 years as a Director I have decided to withdraw in favour of someone younger. I'm a strong believer that we need to develop our future leadership to get some fresh ideas so that we can keep SARC creative, moving forward and vibrant. But fear not, The Communicator will remain my primary task.

This issue has another diverse assortment of content, and I believe that there is something there for every level of amateur radio. There are a couple of articles with a historical account of instances where radio played a key role, one being the London 'Baker Street Walkie-Talkie' Heist'. I'm on the hunt to locate similar stories as they appear to be popular with our readers.

I highly recommend that you have a close look at a new program called POTACat. It is reviewed here, I've tried it on both my iCOM 7300 and on my Xiegu G-90 and I'm very impressed by the variety of features that used to take multiple apps. And... its not just for POTA. I can use it to find and log DX spots and for general logging. Best of all, its free.

Enjoy this issue, and please keep the comments and suggestions coming – communicator@ve7sar.net.

~ John VE7TI, Editor

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Do you have an article photo or bit of Ham news to share? An Interesting story or link?

Something you are looking for?

eMail it to communicator@ve7sar.net for inclusion in this publication.



This Month's Cover...

As you may have read here previously, first class, every school day we have a 17-week high school semester course covering RF Communications, perhaps the first in Canada. I have been co-instructing with Adam Drake VE7ZAL [left on the photo] covering the amateur radio component. We attempt to find as many guest presenters from local clubs and industry to highlight not only amateur radio but foremost the multitude of career opportunities in RF. Shown on the cover are some of the class and Dino VE7NX demonstrating microwave propagation.

Deep summer is when laziness finds respectability – Sam Keen

The Rest of the Story...

Harry Melville Dowsett

The architect of practical radio



Harry Melville Dowsett
1879–1964

Harry Melville Dowsett, born in London in 1879, was a pivotal yet understated figure in the early development of wireless communication. He was educated as an electrical engineer at Finsbury Technical College and, in 1899, joined the Wireless Telegraph & Signal Company—later Marconi’s Wireless Telegraph Company. This was the same year Guglielmo Marconi achieved the historic feat of bridging the English Channel with radio waves. Dowsett quickly became an essential member of the select group of engineers who helped transform Marconi’s experimental sparks into a global industrial force.

Dowsett’s collaboration with Marconi was marked by a clear division between vision and execution. While Marconi had the intuitive brilliance to foresee the potential of wireless communication, it was Dowsett and a select few who turned these concepts into reliable, reproducible technology. One of Dowsett’s first major roles was at the experimental station in Poole, where he assisted Marconi in equipping the HMS Europa. This project was a landmark, as it represented the first practical sea trials of wireless for the Royal Navy, and it demonstrated that this technology could function under the unpredictable conditions of the open ocean.

From Field to Laboratory

As the Marconi Company grew, Dowsett transitioned from field work to laboratory leadership, overseeing the test rooms at the Hall Street Works in Chelmsford—the world's first radio factory. He addressed major engineering challenges of the time, securing several influential patents. In 1920, Dowsett patented a "Crystal Detector of Electric Currents" (US1645523A), which improved the use of carborundum crystals for more reliable signal reception. He also developed an "Electric Oscillator System" and a method for "Transmission and Reception of Pictures" (US1796030A), which focused on transmitting only differences between successive images. This innovation was an early precursor to modern video compression techniques.

Leadership in the Television Era

In the 1930s, Dowsett was appointed Research Manager and became central to the "Television War." As the BBC sought a high-definition standard, Dowsett guided the Marconi Company's shift from mechanical scanning to superior all-electronic systems. He played a key role in the 1934 merger of Marconi's transmission expertise with EMI's camera technology, forming the Marconi-EMI Television Company. This collaboration produced the 405-line system, which outperformed John Logie Baird's mechanical alternative in 1937. Dowsett's team developed the crucial VHF transmitters and antenna systems at Alexandra Palace, enabling the world's first regular high-definition television service for the public.



Professionalization and Education

Dowsett's enduring legacy lies in his commitment to professionalizing the field. He served as Principal of the Marconi College and authored *The Handbook of Technical Instruction for Wireless Telegraphists*, a comprehensive text that was published in eight editions and used for fifty years. By his retirement in 1939, Dowsett had become the technical conscience of the Marconi organization. His expertise continued to be valued during World War II, when he performed special duties for the Air Ministry, underscoring his lifelong dedication to communication science.

Dowsett's Place in Radio History

While Guglielmo Marconi's name is synonymous with the birth of radio, the technical architecture that enabled wireless communication to grow from a laboratory experiment to a global industry was built by brilliant engineers. At the heart of this group was Harry Melville Dowsett (1879-1964).

Dowsett was more than just an employee; he was a foundational pillar in Marconi Company's technical development, an educator, and a historian who chronicled the industry he helped create.

Early Life and Joining the Wireless Revolution

Born in 1879, Dowsett entered engineering during a period of great change. The late 19th

The image captures the Marconi wireless station at the Haven Hotel in Poole. This was one of the most critical testing grounds where Harry Melville Dowsett worked alongside Marconi in the late 1890s. It was from this coastal location that they conducted the long-distance experiments that eventually led to the first transatlantic transmissions.

century was a time when the concept of the "Ether" captivated scientists and inventors eager to send signals through the air without wires.

In 1899, Dowsett joined the Wireless Telegraph & Signal Company (later Marconi's Wireless Telegraph Company). The company was then a fledgling startup, striving to prove to the British Admiralty and General Post Office that wireless signals could reliably transmit messages across previously unimaginable distances.

A Career of Technical Stewardship

Dowsett's career was distinguished by his longevity and adaptability to rapidly changing technology. His roles at Marconi included:

- **Field Engineer:** In the early 1900s, Dowsett played a key role in establishing wireless stations, putting Marconi's theories to the test in real-world conditions.
- **Educational Lead:** Dowsett managed the Marconi School of Wireless Communication, recognizing the need to train a new class of "Wireless Officers" for the industry's growth.
- **Editor and Author:** He edited the *Wireless World* and *Marconi Review*. His textbooks, such as *Wireless Telegraphy* and *Telephony*, became essential reading for aspiring radio engineers.
- **Technical Designs:** Dowsett held many patents on radio circuitry, cathode ray tubes, and early television components.

Relationship with Guglielmo Marconi

The relationship between Dowsett and Marconi was built on mutual respect, representing the dynamic of "Master" and "Workman." Marconi was the visionary, possessing a deep intuition for the medium and business acumen, while Dowsett was the expert who made Marconi's vision reproducible. Marconi depended on trusted assistants to turn his sketches into functional, commercial equipment, and Dowsett was among the select "Old Timers" involved in Marconi's earliest experiments.

In later years, Dowsett became a biographer for Marconi's technical achievements, defending Marconi's legacy against rivals and ensuring the Italian inventor was recognized for his practical integration of wireless systems.

Transition to Television and Later Years

Dowsett kept pace with technological advancements, moving from the era of "Spark and Crystal" to vacuum tubes and electronic scanning. In the 1930s, he was deeply involved in the development of the Marconi-EMI 405-line television system, the world's first high-definition regular service. He eventually became Principal of the Marconi College, securing his legacy through the education of future engineers before retiring in 1939.

Legacy

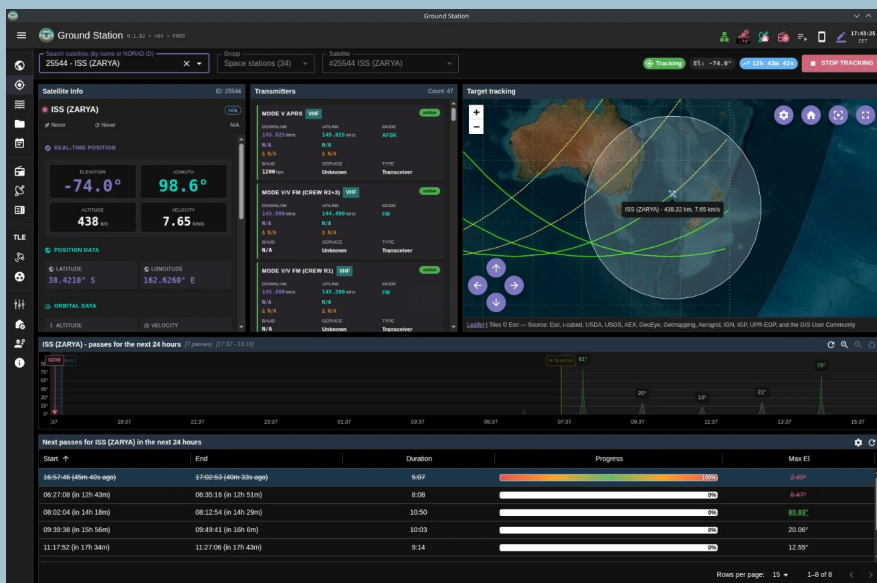
Harry Melville Dowsett died in 1964. Though he never sought the spotlight, his contributions were equally vital to those of Marconi. Dowsett provided the educational framework and technical literature needed for wireless technology to evolve from a mysterious craft to a standardized global science.

Without Dowsett's documentation and training protocols, the rapid expansion of maritime radio—critical after the Titanic disaster—would have been greatly impeded by a shortage of skilled operators.

And that is his story.

~

New “Ground Station” Software Streamlines Satellite Tracking and Decoding



A new open-source software project called “Ground Station” is gaining attention among amateur satellite operators as a unified platform for tracking, receiving, and decoding satellite signals.

Courtesy of [AMSAT News](#)

The software combines multiple functions typically handled by separate tools into a single system, offering a more streamlined approach to satellite operations.

Tracking programs, SDR control software, recording tools, and decoding utilities are often used together, sometimes requiring manual setup for each pass. “Ground Station” aims to simplify this process by automating the workflow from pass prediction through signal reception and decoding.

At its core, the software provides real-time satellite tracking using orbital data, along with automatic updates of satellite elements. It supports a variety of software-defined radios, allowing users to monitor and record signals from multiple satellites. The system also includes automated antenna rotator control and Doppler correction, helping keep signals centered during a pass.

The Ground Station satellite tracking view displays real-time position, orbital data, and pass predictions. [Credit: Ground Station GitHub]

The platform is capable of scheduling and executing satellite observations automatically, reducing the need for operator intervention.

During a pass, it can record IQ or audio data and process common digital modes, including telemetry formats used by many amateur satellites. This is useful for operators interested in telemetry collection, CubeSat monitoring, and general satellite experimentation.

In addition to amateur radio satellites, the software integrates with tools such as SatDump to decode weather satellite transmissions, including NOAA APT and other imaging formats. This expands its usefulness beyond traditional amateur satellites to include weather satellite reception and other downlink services commonly monitored by the amateur community.

“Ground Station” is an early-stage, actively developed open-source project available on GitHub at <https://github.com/sgoudelis/ground-station>. Users can learn more about the software and access installation instructions there. As development continues, it offers a path toward more fully integrated ground stations, lowering the barrier to entry for satellite reception while providing experienced operators with a flexible new tool to explore.

~ AMSAT News

Trials and Errors



Dave Jensen, W7DGJ, was first licensed in 1966. Originally WN7VDY (and later WA7VDY), Dave operated on 40 and 80 meter CW with a shack that consisted primarily of Heathkit equipment. He has published articles in magazines dealing with science and engineering.

On the Air with Zane Grey in Tahiti

by DAVE JENSEN W7DGJ

As my readers know, I live in Arizona, so it is only natural that I'm very familiar with the well-known author of Wild West books, Mr. Zane Grey. Grey wrote so many of the best-selling Cowboy stories from those days in the early 20th Century. We've seen them made into movies ("Riders of the Purple Sage" and many others) and know that John Wayne's cowboy persona was usually based on Grey's characters. His novels and written exploits made him quite wealthy.

The author used some of that wealth to purchase a 114-foot schooner, The Fisherman (photo above in Waitemata Harbour, New Zealand 1927) which he used to travel the world. Grey chose to travel the "little known" waters of the day, which often meant that he did a lot of exploration around the islands of the Pacific and Australia/New Zealand. The mid-to-late 1920's were still early in our radio history and explorers like Grey and others thought that radio amateurs could put this new "miracle of communication" to work as an aid to their exploration. This was true of the Arctic, Africa, or in Grey's case, the waters of Oceania. Those early explorers and their radio teams then became the first of our DXpeditions. This is the story of one of those first DX trips to the middle-of-nowhere.

I will include sports fishing records in my discussion of Zane Grey because he is still known for his fishing expertise as well as the novels he wrote on board The Fisherman. Grey pioneered some of the methods still in use today to land the really big ones. He brought sport fishing into the limelight and increased the public's interest in the hobby.

Outfitting The Fisherman for World DX Radio

Zane Grey was not himself a ham. But like many other explorers, he recognized that amateur radio could be a great benefit to The Fisherman as it traveled throughout the South Pacific on what was labeled as a "semi-scientific" journey. Just as MacMillan had done before his exploration of the North Pole, he approached the radio community in order to find not just a station for his schooner, but a radio operator who would see this as an opportunity to make history on the air.

For that honor, he selected Karl E. Zint [6ZCB, and later W6ZCB] who then operated station KNT from onboard The Fisherman. Zint was a young man at the time, barely out of his teens. Despite his young age, he came on board with a solid understanding of the electronics involved in both amateur radio operation as well as commercial broadcasting. The January 1927 issue of QST described Zint as a "glutton for QSO's," and because the ship also carried a commercial transmitter on board, Zint could use his prior experience operating in that world as well. Another source described Zint as "one hell of a commercial brasspounder."

It took a year to outfit the schooner for its intended mission, which included the time to get a state-of-the-art station installed -- a Los Angeles commercial radio dealer was told to look

for "nothing but the best." That 1927 issue of QST describes the station very specifically: "The transmitter uses two quarter Kw. tubes in a 500-cycle self-rectifying circuit. The wavelength range is from 15-60 meters. Along the operating table, the receiving equipment was carefully selected in order to cover the entire range of wavelengths in use today. Everything was designed with neatness and efficiency as of equal importance."



The antenna remains a bit of a mystery to me; perhaps a reader can illuminate in our forum what design this may be implying. Here's how it is described in the literature: "The antenna presented quite a problem. On the foremast, a cross spar as wide as the boat was installed and from this the antenna drops directly to the transmitting room on the starboard side of the ship. Operation is on the fourth harmonic of the antenna."

Zint wanted as much freedom as possible for his transmitter frequency, as he was uncertain what conditions would be in that part of the world . . . I am assuming his choice of antenna would reflect that flexibility. Once The Fisherman reached islands in the South Pacific, Zint found that 40 meters was the best use of his transmitter power and as a result that band is where 70% or more of his many logged QSOs took place on this DXpedition.

Not all the specialized equipment on board The Fisherman was radio gear. The mission as set about by Zane Grey had a scientific underpinning, as Grey considered himself a true explorer. But he was also an avid fisherman. Therefore, there was a good deal of newly designed fishing apparatus -- new types of rods and reels, a specially designed chair for the one with a line in the water, and other equipment that he hoped would allow him to bring home new and very different kinds of fish. He knew

Radio <i>C5A1</i>	Your station was <i>WHD</i> here <i>Jan 3, 27</i> at <i>11:0 PM</i> <i>NZ</i> time
Audibility <i>R 4</i>	QSS <i>Nil</i> QRM <i>160</i> QSSS <i>Yes</i> QSB <i>Rec.</i> QRN <i>Yes</i>
KNT Schooner-Yacht FISHERMAN Owned by ZANE GREY. Position <i>Auckland New Zealand</i>	
TRANSMITTER Self-rectified tuned grid and tuned plate circuit, using two UV204A tubes with 500-cycle supply. Input was <i>1000</i> watts.	SHORT-WAVE RECEIVER Grebe CR18 150-1000 METER RECEIVER Grebe CR6 LONG-WAVE RECEIVER Grebe CR7
Remarks <i>Dr. sigs have tendency to chirp, making you hard to read. V. good to get you as conditions been by far here lately.</i> Please QSL your card to me care of <i>F.L. Dewey, 473 130 So. Spring St. Los Angeles, Calif.</i> <i>Karl E. Zint, Operator.</i>	

how large those ocean dwellers could get as he lived on Catalina Island in Southern California. Therefore he had installed large, custom tanks on board The Fisherman. Grey hoped his journeys would fill those with as-yet-unnamed fish species from the waters of the South Seas.

The Fisherman Leaves Southern California Headed for Oceania

On the morning of November 9th, 1926, The Fisherman left Long Beach, California, headed for the South Seas. Radio communication was quickly established with US amateur radio operators as they began their voyage. It was Karl Zint's intent to stay on the air as much as possible during both day and night using both amateur and commercial rigs. (Photo shown is ChatGPT produced, but based on an old QST image of how the radio room was set up on The Fisherman.)



In Conclusion

Zane Grey -- His impact on sport fishing includes over a dozen world records for big game fish. His ideas include the hookless, artificial, or natural baits used to attract billfish or sharks to the

Prior to 1939 when the International Game Fish Association was founded, the world of fishing enthusiasts didn't believe that anyone would attempt to go after a 1000 lb. Marlin with a rod and reel. Most people didn't even believe that such a fish could exist. That's why Zane Grey was so far ahead of the pack in the 1920's to assume that these fish existed and to spend the small fortune he did on getting out to those waters to find one. His purchase of The Fisherman, the hiring of a crew, the installation of a radio room to communicate the success of the mission . . . it was all part of the single-minded pursuit that Grey mounted to catch this monster fish.



Upon reaching the Tahitian islands, Grey heard about the mythical Tahitian Striped Marlin, but went over 80 days without a bite. Others had caught some large Sharks, Wahoo, and Tuna, and one good-sized Marlin had been hooked but lost. It was really getting to Grey, but patience is a key attitude of the successful fisherman. It was a morning in May when one simply gigantic fish took his Bonita bait and started pulling the schooner along. Grey was using a large wooden rod with a huge reel capable of holding 1500 feet of 39-thread line (117-lb test linen with 42-thread, 126-lb test backing line.) The battle lasted for a number of hours, and over that period the gigantic fish leaped more than a dozen times out of the water. They thought they had lost him when he took a dive under the boat, which had gone more than ten miles since the fish was hooked earlier that morning.

When the fish, finally exhausted, moved to the side of their vessel it was attacked by sharks who treated themselves to the Marlin, which resulted in a bloody fight-to-the-finish with the crew (who used every implement they could find to beat them over the head). When raised from the water, the monstrous fish had lost much of it's tail, but upon weigh-in on the shore, it was a shocking 1045 lbs, and a world record. The species was later named the Pacific Blue Marlin.

surface (called Teasers). He also worked with manufacturers to develop reels capable of holding 500+ yards of line to fight these massive fish, including specialized hooks he designed for broadbill swordfish. Most importantly, he established the foundation for deep-sea angling and those sport fishing techniques that are still being used 100 years later.

Karl Zint [W6ZCB] -- Karl was instrumental in keeping The Fisherman in touch with both hams and newspapers who were following the mission as it moved over the course of many, many

months throughout the South Pacific islands. Upon his return, Karl moved to the Motion Picture world, a booming industry in his native Southern California. IMDB shows how Zint took on multiple roles over the years in Sound Design for the "talkies" of the day, including films invested in by Zane Grey. He became a Silent Key in 1978.

Thanks and VY 73

~ Dave W7DGJ

[Dave Jensen, W7DGJ](#), was first licensed in 1966. Originally WN7VDY (and later WA7VDY), Dave operated on 40 and 80 meter CW with a shack that consisted primarily of Heathkit equipment. Dave loved radio so much he went off to college to study broadcasting and came out with a BS in Communications from Ohio University (Athens, OH). He worked his way through a number of audio electronics companies after graduation, including the professional microphone business for Audio-Technica. He was later licensed as W7DGJ out of Scottsdale, Arizona, where he ran an executive recruitment practice (CareerTrax Inc.) for several decades. Jensen has published articles in magazines dealing with science and engineering. His column "Tooling Up" ran for 20 years in the website of the leading science journal, SCIENCE, and his column called "Managing Your Career" continues to be a popular read each month for the Pharmaceutical and Household Products industries in two journals published by Rodman Publishing.

"It depends. What do you want to do with it?"

As a retired teacher and part-time I.T. manager, that was always my answer when someone asked for tech advice. For this blog, the answer to "Why operate from a recliner?" is simple: Because life happens in the living room, not the shed.

Welcome to ROTA: Recliners on the Air. My name is Paul (N4FTD), and I'm the Control Operator of this little digital experiment. My mission is to show you how to stay connected to the ionosphere without disconnecting from the people in your own home.

The Mission

This blog is dedicated to the "Architecture of Presence." It's about the technical and metaphorical journey of moving a world-class amateur radio station out of the isolated "shack" and into the heart of the home.

What to Expect Here

If you decide to spend some time in my neck of the woods (or my corner of the living room), here is what we'll be exploring together:

The Radio Metaphors: I don't just talk about COM ports and IP addresses. We'll be discussing "The Radio Engine" in the shed, the "Digital Plumbing" in the walls, and the "Tunnels" that connect them.

Parallel Play: How to chase a POTA (Parks on the Air) activator while sitting side-by-side with my wife, Sue, as she watches the news or chats with the grandkids.

Caregiver Command: The reality of being a primary caregiver while maintaining a high-tech hobby.

The Technical "Because I Can": Real-world troubleshooting of the new Icom IC-7300Mk2 and the software that makes remote operation possible.

Why the Recliner?

Because a 21-foot campervan, a 7-mile GMRS link to my grandkids, and a shed-shack are all great—but the most important "DX" is the person sitting three feet away from me in the living room.

I'm glad you're here. Let's start digging some tunnels.

~ <https://rota-radio.com/>

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News You Can't Lose



The 2026 FIFA World Cup will be hosted for the first time in 3 countries - Canada, Mexico and the United States. This will involve 16 host cities across North America with Vancouver being one. The tournament will start June 11, and run through July 19, 2026.

Special event website <https://wc2026ses.org>

In support of Vancouver as a host city, a special event station Amateur Radio call sign has been assigned to the Vancouver Host City Radio Team - VB7F and will be active June 11th through July 19th.

It is anticipated that this unique call will create considerable interest amongst the Amateur Radio community worldwide as a result of the unique VB prefix and 2x1 call. In addition, special QSL cards and participant certificates that will be produced by all host cities for the event.

Activity is anticipated on all HF bands and modes (*propagation permitting*).

We are currently looking for operators with access to transmitters within BC to help activate the VB7F callsign for much of the tournament period. You can register to operate starting May 5th at <https://www.vb7f.ca>

If you have any questions, you can contact me at the email below.

~ Hiroshi Takahashi, VA7LET
Director BC and Yukon,
Radio Amateurs of Canada

ses@radiatoroom.ca



Page13—News You Can Lose

The Lighter Side of Amateur Radio

ARRL Field Day...

Where's Who?



Radio Ramblings

Artificial Intelligence: A Peek Under the Hood

by KEVIN McQUIGGIN VE7ZD / KN7Q

Kevin Ahrens
www.kevskaptures.com



Kevin VE7ZD/KN7Q
is active in EME,
meteor scatter and
much more. He lives
on Vancouver Island.

Artificial Intelligence (AI) seems to be everywhere these days.

This issue I'd like to look "under the hood" with AI and the latest "Large Language Models" (LLMs), describe how they work, and imagine how their role in society will evolve over time.

I last covered AI in this column in March 2023 with an introduction to the technology, but the capabilities of AI are evolving rapidly, so it is time for an update.

Let's start by looking at the social impact of this amazing new technology, because the advancements in the latest LLMs have as much potential for negative impact on human learning and creativity as they do positive. It all depends how we choose to integrate AI into our lives.

Ethical Considerations

AI and LLMs represent a dichotomy: they are both an excellent tool for learning and innovation but also, possibly, represent a significant risk to humanity's future; one that will de-skill workers, have negative impact on education, underscore social division, and leave people dependent upon the technology for their day to day lives.

How AI evolves and how it impacts society will depend on us.

While a significant amount of AI research is occurring in universities, the push for more powerful AI is being spearheaded by private companies. Being profit-driven, the private sector has less concern for the ethical impact of AI than academia has.

Several university researchers have voiced their concerns about how the capabilities of LLMs and modern AI systems are evolving so quickly without sufficient safety constraints, but by and large these concerns have only been weakly addressed by the private sector.

LLMs have promoted racism [14], counselled suicide [13], stoked division in society and promoted incorrect scientific theories [15]. Close to a majority of young people report using AI in school or university, and many even use it to complete their assignments in both scientific and artistic fields.

While the potential of this new technology is amazing, the negative characteristics of it need to be controlled through ethical development, and people need to be mindful of AI's limitations before they fully adopt it and incorporate of these systems into their lives.

The Market Economy

Private companies showcase their advances in AI and LLMs to raise their profiles, attract funding, and (ultimately) increase their market value, while usually underestimating the potential negative effects of adoption of the technology on our lives.

This may be only natural, given that billionaire investors have provided millions of dollars of funding to the smart people running these start-ups, but the social impact of a new technology should always be given thorough consideration.

Profit “at all costs”, without full consideration of the broader impact of any technology is not ethical. Innovators and start-up companies have an ethical responsibility (as we all do) to protect society as a whole. Start-up companies need to think about how their creations will affect society.

All of us know from experience that things can often go wrong. With regard to new technology, things often go wrong in unexpected ways. If

poorly designed or misapplied, some new technologies can generate serious unexpected consequences.

Companies have a responsibility to consider this possibility and design safeguards or limitations into their products. Cars have seat belts, tobacco products include health warnings, and you cannot buy plutonium or land mines at the corner store.

The “social contract” [1] expects both individuals and companies to support the best interests of the public. Regulation and standards support the public interest. The private sector dislikes regulation because it affects their profitability.

A common retort from the private sector in response to calls for regulation is that these rules are “bad” because they restrict profit. The best course of action, from the perspective of the market economy, is to offer all products for sale and “let the market decide”.

In this worldview, a product with net negative impact on society will not sell. We all know, however, that this is a simplistic approach to ethical behaviour. It's just a convenient way for the private sector to sidestep the social contract in order to generate higher profit. Being profitable does not necessarily mean that a product is ethical [2].

Neutrality

Technologies are neutral. They are not “good” in and of themselves; while technological advancement has been a characteristic of human development for thousands of generations, it is how these technologies are applied, and how their usage is shaped by culture and ethics that determines whether a new technology will have a “good” or “bad” net impact on humanity.

Fire can cook our food, or burn down our villages. The printing press can democratize reading and writing, or it can serve as a tool of social oppression. Nuclear science can be used to power cities, or level them.

AI can support discovery and learning, or it can de-skill learners and workers and leave humanity less able to think and create for themselves. We need to ensure that we avoid this second outcome.

A well-researched aspect of new technologies determined that any new technology will shortly be put to use in a negative manner; usually by unscrupulous individuals who seek to take advantage of others in society for their own benefit. Often this misapplication is criminal in nature [3].

It is important for developers of any new technology to consider both the positive and negative impacts of the technology upon society. How could their discovery or innovation be misused?

A narrow, profit-driven view of technological ethics is myopic. Market-driven economics needs to more strongly incorporate ethical consideration of the effects of new technologies. It is good to profit economically, but not at the expense of the customer base.

Acceleration

The incredible speed of technological change in the past twenty-five years has made consideration of technological ethics much more important than it was in previous centuries. In simpler, non-connected times, new technologies spread slowly: it took decades or centuries for a new idea or tool to be adopted, and to spread geographically to finally reach a global community.

This was plenty of time to discover and correct mistakes, or to develop ways of handling misuse of the new technology.

The printing press, for example, presented a similar disruptive risk to society as AI does today, but the interval between the introduction of printing in China (~600 CE) or in Europe by Gutenberg (late 1400s CE) and the universal adoption of the technology was (at least) a century: there was ample time for society to understand the ethical aspects and social impact of the technology.

In 2026, new technologies like advanced AI models promulgate via the global Internet and can reach the entire (developed) world in seconds. We can no longer depend on the luxury of having a century to discover societal risks caused by unanticipated aspects of the technology, or by misapplication of the technology by criminals or unethical groups.

The “pedal goes to the metal” from the instant the new AI model is deployed, and there is no throttling back. Therefore, developers need to fully consider these risks prior to releasing their technology on the world. “Letting the market decide” is a poor strategy.

Let’s Dig into the Tech

Enough consideration of the ethics of AI and LLMs. Let’s get into how these models work, and why they work so well.

In AI, the term used for an entire AI package or system is a “model”. There have been dozens of different types of models over the past decades of AI research. Earlier models like those developed in the 1970s or 80s were simplistic and had a low level of performance. A class of models called “Transformers” emerged around 2018, and these predominate today.

“Transformer” models can perform at a very high level, as we can see with systems like “ChatGPT”, but this comes at significant cost in terms of computing power required to develop and run them. The massive parallel processing and storage requirements behind these models is another negative aspect of these systems due to their significant environmental impact.

Training

Models encapsulate a system’s capabilities, but all AI models must be “trained” before they can be used.

One question that humans believe to know the answer to at this time is whether an AI model has a true understanding of grammar and context within a language. Does the model “understand” the text that it reads from a user, or the replies that it generates?

The answer, at least in 2026, is that the model does not: through analysis of the material in its training set, a model knows what word, or what type of sentence fragment, usually follows another, and can synthesize (generate) output statistically based on its “training set”. It lacks a true understanding of what it is doing. A model is a statistical automaton.

A training set is a large volume of text-based material that is used by the model to develop a statistical model of the English (or any other)

language. Models for other languages are trained using training sets composed of material in that language. Knowledge of grammatical structures of languages (ingested via the model's training set) lets the model know how to translate one language to another with reasonable accuracy. This is the basis for free services such as "Google Translate".

The Training Set

What's in a training set? Any and all textual material that can be downloaded from the Internet. Books, academic writings such as journals, papers, theses, and the like are augmented by encyclopedias such as Wikipedia, newspaper context, web sites, forums, and even the archives of social media services.

Like search engine services, AI researchers send out "crawlers" that scrape as much textual material as they can from the Internet. All recovered material goes into the training set.

The inclusion of the fact-based accuracy of scientists, researchers and professional authors is balanced by the state of language and range of societal standards on social media.

Analysis and scoring of the training set "teaches" the model the structure of text in many languages and allows it to get a handle on "context": the way individual words and phrases are used together to form sentences.

The highest performing transformer models today have been training on hundreds of billions of textual documents available via the Internet.

It is key to remember that these databases simply record statistical information on word and sentence fragments. The models have no understanding of the meaning of the underlying text. They simply examine the training set, analyze, and classify the word relationships in sentences, determine common word order, and discover and score grammatical structure.

The model uses these statistics to respond to a user's input by formulating a response based on the information in the training set. There's no objective "truth" in an AI-generated response, just a grammatically-correct answer that reflects what the training set scores as the most likely response, based on ten to one hundred billion documents scraped from the Internet [4].

As I discussed in this column in March 2023 [5], all AI models are, in essence, pattern matching systems.

Natural Language Processing

Artificial intelligence has been a dream of computing science researchers since the 1930s.

Natural language processing (NLP) is the foundational technology underlying all current AI systems. NLP has a simple goal: to analyze written text with the objective of determining meaning. It works to interpret words and written language in context.

This is a very complex problem. Decades of research in computing science and linguistics produced marginal results until the 2000s when computing power, and in particular parallel processing, had advanced to a very high level.

In regard to sentence analysis, NLP seeks to [6]:

- Classify the words in a sentence to identify its grammatical components (such as nouns, verbs, and adjectives), as well as what are termed as the "named entities" (such as persons, locations, and organizations) in the sentence;
- Use this information to classify entire sentences to determine their meaning and grammatical correctness;
- Generate text based on the meaning and context of all the previous input; and
- Answer questions and even translate text into another language.

An NLP system that can perform these tasks can converse in context with a human and generate grammatically correct, reasonably coherent replies. The system mimics human understanding within the context of the discussion and many users may not be able to tell that they are conversing with a computer.

This fulfills the earliest goal of AI researchers in the 1930s and 1940s: that users of a successful AI system will be unable to determine whether they are speaking with a human or a computer. This specific goal is called the "Turing Test" and was first devised by the famous mathematician Alan Turing of World War II codebreaking fame [7].

NLPs develop an internal database that documents previous conversations and contexts

that can be used to support future conversations. The NLP uses the training set to develop an understanding of grammar and context in a particular language.

Large Language Models (LLMs)

LLMs are an extension to basic NLP models. As described above, LLMs leverage the basic capabilities of NLPs by doing additional training. Through this training process, the LLM learns from deeper analysis of grammatical and contextual analysis of millions of documents, reports, and social interactions to develop new capabilities. To adapt a military term, it's a "force multiplier"

According to one of the most popular websites for learning and developing LLMs [8],

"A large language model (LLM) is an AI model trained on massive amounts of text data that can understand and generate human-like text, recognize patterns in language, and perform a wide variety of language tasks without task-specific training. They represent a significant advancement in the field of natural language processing (NLP)."

LLMs' amazing new capabilities include being able to perform new tasks without task-specific training, and exhibiting what is called "in-context" learning: an LLM can learn from examples provided by humans in the form of user input.

Another impressive new aspect is that:

"As these models grow in size, they demonstrate capabilities that weren't explicitly programmed or anticipated" [9]

Let's look at how is this possible.

Quantum Leap: Transformers

The concept of a "transformer" was first described in a seminal AI paper published in 2017 called "Attention is All You Need" [10]. The transformer is a new conceptual approach to NLP textual analysis which breaks natural language processing into two classes: encoders and decoders.

Encoders work like traditional NLP models - they receive input from a user and build a

representation of the words, phrases in the text, the order of the elements and classify the textual elements into classes such as nouns, verbs, and adjectives. This type of encoder tries to fully understand its input.

The decoder is linked to the encoder. The decoder reviews the analysis from the encoding process to attempt to generate a contextually correct response to the user. Key is that the decoder may also utilize additional input from the training set, generate feedback to the encoder, or use a local record of the context of the conversation to generate an appropriate output message.

Transformers contain an additional processing element that is called the "attention layer". The attention layer tracks and emphasizes key words and phrases in the input and gives less emphasis to other less important textual elements. Through this additional scoring, the layer subtly steers the focus of the LLM's textual response towards a contextual goal.

Through this process the attention layer supervises the work of the encoder and decoder to identify output goals across several prompts and responses. It then influences the decoder process to ensure that the subject, and the context of the recent discussion - for example, that idea that you mentioned three or five prompts back in the chat - is not lost.

Coupled with the option to use the key ideas in the text to gather more information from the training set, the incorporation of the attention layer has (pardon the pun) transformed the effectiveness of LLMs and produced amazing results which are not only grammatically correct but also insightful and creative.

This is not to say that transformer-based AI cannot "hallucinate": LLMs can occasionally make false statements or quote non-existent sources, for example, but the general quality of the human-machine interaction is much more effective than that of NLP models alone.

This process sounds complicated, and from my reading it certainly is, but the general characteristics of the encoder and decoder models and the attention layer are well described for the novice reader in the open-source course described in the references section.

The ongoing issues with large language models include:

Characteristic	Description
“Hallucinations”	Models may fabricate information, although they usually present it authoritatively
Lack of true understanding	The models lack actual understanding of the world, and their responses are based purely on statistical probabilities
Bias	LLMs may inherit bias from their training data. Due to their reliance on statistical probabilities, this bias can be reproduced in their output
Computational resources	LLMs are currently very inefficient and consume significant energy

Table 1 – Performance Issues with LLMs

Computational Complexity and Resource Requirements

Now is a good time to take a brief detour to discuss the environmental demands of deploying and running LLM systems. Environmental impact is a hot topic in the AI field as companies are acutely aware of the significant amount of electrical power that is required to run these systems. Many governments have gotten involved, seeking to regulate AI power consumption.

This harks back to our earlier discussion of ethics. The unchecked stress from AI installations on the globe’s electrical infrastructure is an unanticipated outcome from the innovative work on AI development.

LLM systems are huge. Scraping training data from the Internet requires high bandwidth and petabytes (thousands of gigabytes) of storage, and training of an AI model on this data requires hundreds of billions of documents to be deeply analyzed and classified to determine the training set. A single run to populate a training model for an LLM can take weeks.

Once the initial model is trained, it must be “fine-tuned” with additional runs and more detailed information to focus the LLM’s application to a specific field. More on fine tuning later in this article.

The environmental impact of gathering data, classifying it and performing the analysis required to complete the model’s training set is

enormous. The electrical power requirements alone for a single AI data centre can rival the megawatt-hours needed for a small town. Hundreds of data centres are needed to meet the global demands of users, to spread out the network traffic, and to create redundant training set locations.

This places a significant load on the earth’s energy demands. While there is insufficient electrical power for cities, towns, and villages for many countries in the developing world, AI’s increasing requirement for electricity stretches the world’s generation resources even further.

It’s an ethical dilemma: is it better to consume a year’s worth of electricity to train a new LLM for use in developed nations, or to provide a year’s electricity to the disadvantaged people of an undeveloped nation which does not have a functional national electrical grid?

Electrical power generation for AI impacts the environment. There are simply not enough renewable energy sources (dams, wind farms, tidal generators, et cetera) to meet of AI’s needs, so it is inevitable that AI will need to consume energy generated by fossil fuels.

AI leaders are acutely aware of these concerns and are working to improve the efficiency of LLM training and fine tuning. See a short video called “The Carbon Footprint of Transformers” at <https://www.youtube.com/watch?v=ftWlj4FBHTg>.

Leverage of Pre-existing LLMs

Fortunately, it is possible for new AI systems to take advantage of work already done.

LLM training consumes so much energy that it is rare for new models to be designed by companies or individuals that will build a new LLM model from scratch. Building a new LLM from scratch will cost millions of dollars and require years of work. It is not cost-effective.

It is a far better idea for the researcher or entrepreneur (or amateur radio hobbyist) with a great new idea to leverage the existing LLM models so that they can take advantage of the groundwork that has already been invested in them.

Many LLM models (as of 2026) are open source and freely available for use by new developers. I would rather leverage an existing LLM that has ingested and analyzed 100 million documents than develop my own LLM from scratch!

This is the best “way to go” for new users and those interested in learning about the technology. The open-source course linked in the references leverage nine NLPs and LLMs referencing billions of parameters each [11].

Use of an existing LLM will not limit your customized model’s functionality. For example, if you want to develop an amateur radio LLM, you can choose a pre-existing (fully trained) LLM such as GPT-2 or Grover (see Figure 1) and fine tune it!

Fine Tuning

There are processes that can be used to fine tune a pre-existing LLM to, in effect, give the model new knowledge in a specific area so that it will be able to extend its basic functionality to include knowledge from the new subject area. See reference [12] for an overview of how to fine tune a pre-existing LLM. This is quite a technical topic that should be preceded by taking the earlier parts of the open-source course first.

Fine tuning an existing LLM is easy using a free facility called NotebookLM from Google. I have run some tests on this service, and it does a great job of hiding the complexity of the underlying NLP and LLM models behind a simple user interface.

Rest assured that after reading this article you will understand much more than the average user about what is going on behind the scenes!

Examples from NotebookLM will follow a few examples adapted from the open-source course [8] below.

Examples Using NLP and LLMs

I am taking the open source LLM course in [6] to update my AI knowledge from the last time I studied the subject in 2019. As will be clear from the discussion above, LLMs and transformer technology has revolutionized AI and brought the technology to a much more advanced level.

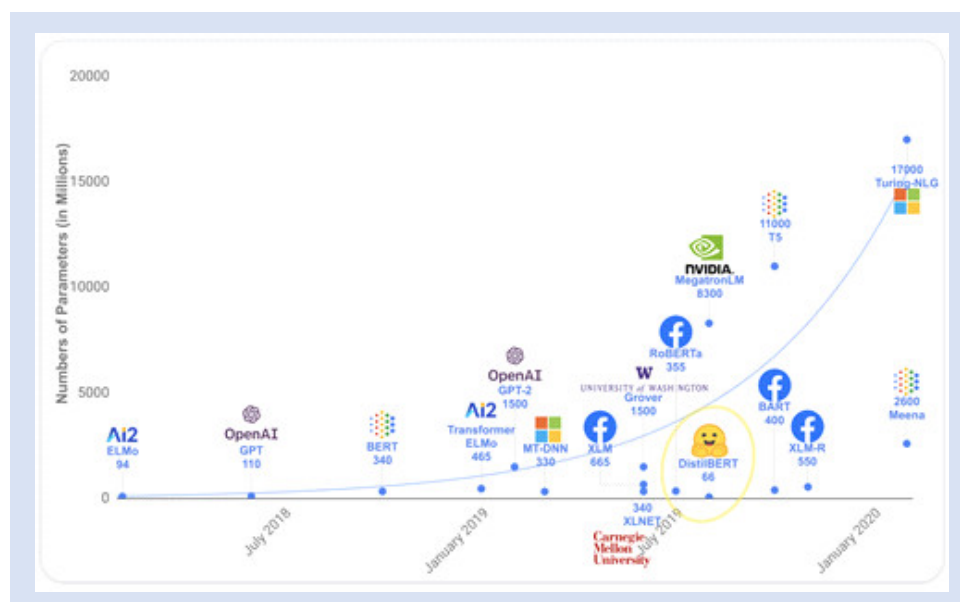


Figure 1 – Complexity of Transformer Models 2018 – 2020 [11]

I have adapted several examples from the course for display here. They show how one can use a programming interface to access an existing LLM and interact with it.

These examples were run on the “command line” interactively with the LLM. Do not get concerned about the syntax - the interesting part is to read the input to the model, and its output. Most queries generate a response and a “score”. The score illustrates how these LLMs rely on statistics to determine what the response to a particular input should be.

Scores are presented by the model in a range of 0.0 to 100.0. A score of 0.60, for example, indicates that the model has found the particular reply to be 60 percent likely. A score of 0.05 means that the reply given is 5 percent likely. Usually, the most likely (highest scoring) output from the training set will be the answer/ response produced.

If you have used ChatGPT or another online AI service, these scores are hidden from your view. I ran the examples on the command line and included the scoring here just to give you some insight into how the LLM works!

Here we go.

A) Read a statement and classify it as positive or negative, and state the LLM’s level of confidence:

Description	Input	Response	Score
Classify a statement as “positive” or “negative”	“Amateur radio is an interesting hobby.”	POSITIVE	0.958

The LLM says that the input statement “amateur radio is an interesting hobby” has a 95.7 percent chance of being a positive statement.

B) Do the same type of classification, but with an input statement that contains an element of uncertainty or challenge. Learning curves scare people!

Description	Input	Response	Score
Classify a statement as “positive” or “negative”	“I want to learn a bit about how LLMs work, but there will be a learning curve.”	NEGATIVE	0.849

A statement that is primarily positive but shows that the user is a little bit nervous about how hard it will be to learn.

C) Classify it according to a list of arbitrary categories. In this case, relate the statement to categories of education, politics, and business. The list of categories is not limited to these choices. The LLM will use it’s training set to understand what the categories mean:

Description	Input	Response	Score
Classify a statement using arbitrary categories “education”, “politics”, “business”	“The SARC ham course prepares students for the ISED ‘Basic’ examination.”	Education Business Politics	0.849 0.111 0.038

The LLM thinks that the statement relates to education 85 percent; business only 11 percent, and politics only about 4 percent. Pretty nice work!

D) This example demonstrates text generation by completing a sentence. *This example shows the generality of the LLM and how it lacks real understanding of the context of amateur radio:*

Description	Input	Response
Text generation	“In the amateur radio course, you will learn how to”	Too big to fit into this table - see below!

The response of the LLM is a meandering and generally inaccurate set of sentences that provide a perfect example of how an LLM lacks “real world” knowledge of a subject. The LLM in use clearly has very little understanding of radio and would be outperformed by an LLM that had received fine-tuning on the subject of amateur radio.

Response
In the amateur radio course, you will learn how to use a digital radio transmitter to transmit data to a radio station <u>in order to</u> broadcast a live broadcast. ... You will also learn to build your own transmitter, based on the radio transmitter you are using. ... There are also other important features: The transmitter will be able to transmit data to the radio station and will be able to transmit data to any other radio stations. ... There will be no need for the radio station to be able to use the radio transmitter in the course. You will not need to pay the cost of the transmitter, and <u>all of</u> your equipment will be free of charge.

This is an excellent example of how LLMs can generate responses that are incorrect!

Examples Using NotebookLM

Let’s move to a few examples of a customizable, online LLM. You can experiment with this service yourself.

NotebookLM is a free service of Google and is at <https://notebooklm.google.com/>. You just need a free Gmail account. Create your account, log in, and go to the URL.

Here's a short introduction to the service.

Create a "Notebook" using the button at the top right of the home page. See Figure 2. You'll see the new "Untitled notebook".

Figure 2 [right] - NotebookLM
- Create a Notebook

You are now connected to a base version of ChatGPT. You can ask questions (see "Start typing..."), and receive replies, but it is far more valuable to add some "Sources" to the session in your area of interest.

When you add sources, you fine-tune the base LLM.

ChatGPT will review the added sources and incorporate their content into the LLM that is active when this notebook is used. This is the technology described above in action!

If you wanted to develop, for example, an LLM that has specialized knowledge in the field of amateur radio, then you can add some amateur radio books, magazines, or other material as sources.

For this example, I chose to add the six issues of "The Communicator" from 2024 to the model. Added sources are indicated on the left hand side of the NotebookLM page. See Figure 3.

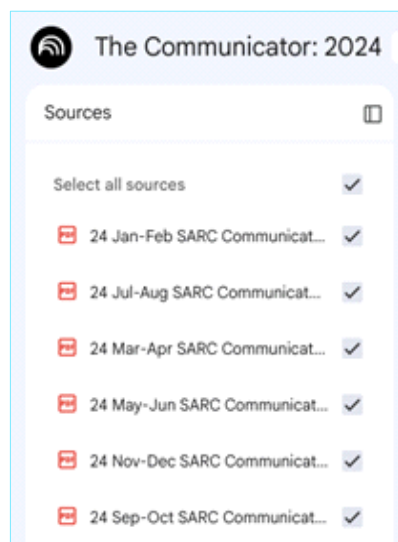
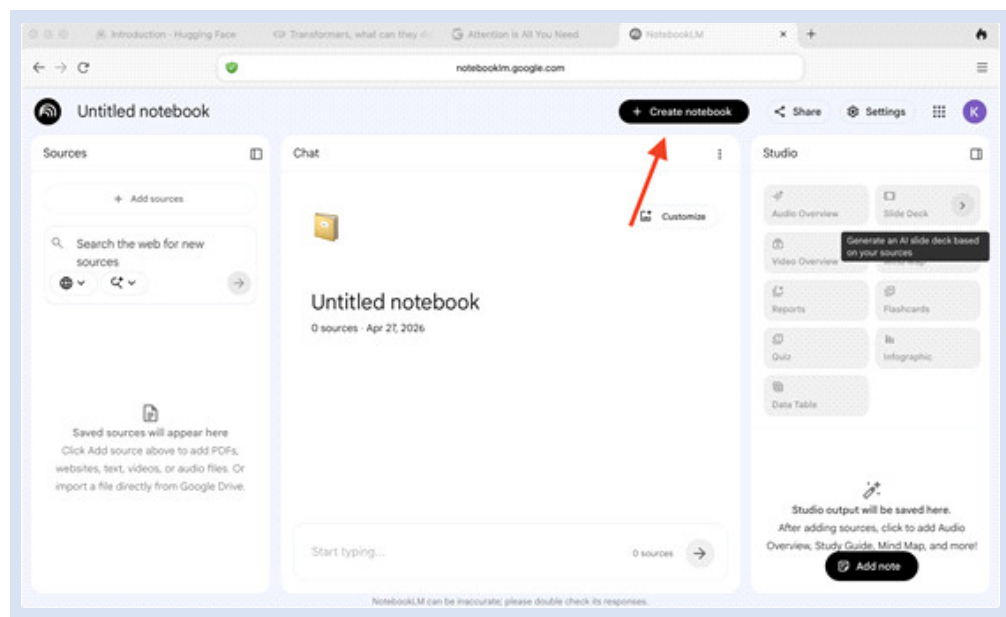


Figure 3 -
"Communicator"
Sources Added

The checkmark to the right of each of the issues shows that its content will be considered in the chat.

Now when you interact with ChatGPT using the "Start typing..." box, ChatGPT will also consider the



six issues of the magazine in replying to your questions.

For example, I can now ask questions specific to the content of the sources such as SARC. See my question to the model in the grey box at the top of Figure 4.

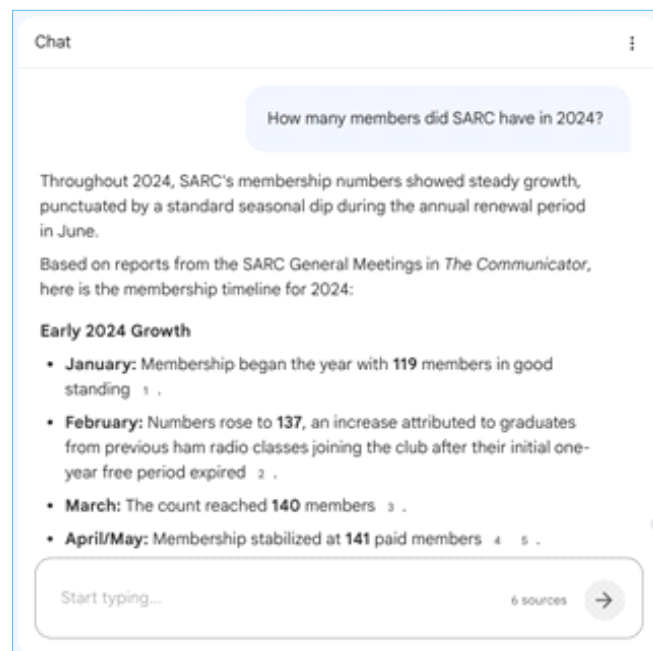


Figure 4 - LLM Answers Questions

ChatGPT can also provide detailed analysis of the articles in the six issues. See my query at the top of Figure 5. Note how the model "understands" that VE7TI is John Schouten.

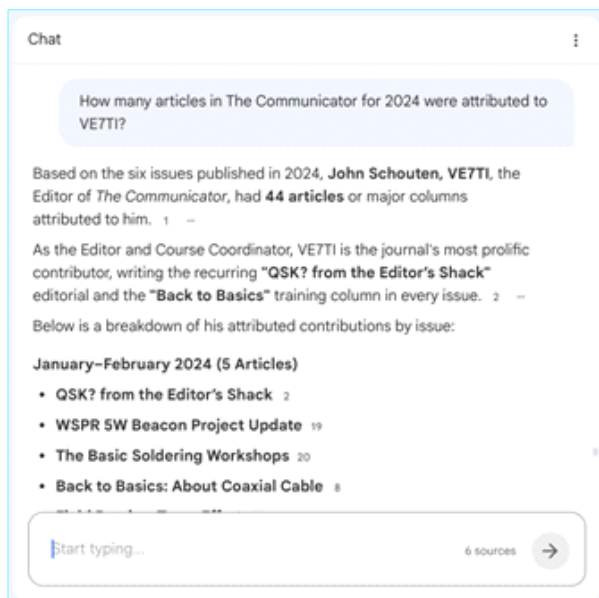


Figure 5 – Article Analysis

The fine-tuned LLM can also do quite detailed analyses. In Figure 6 I asked a question that it would be difficult for a human to answer.

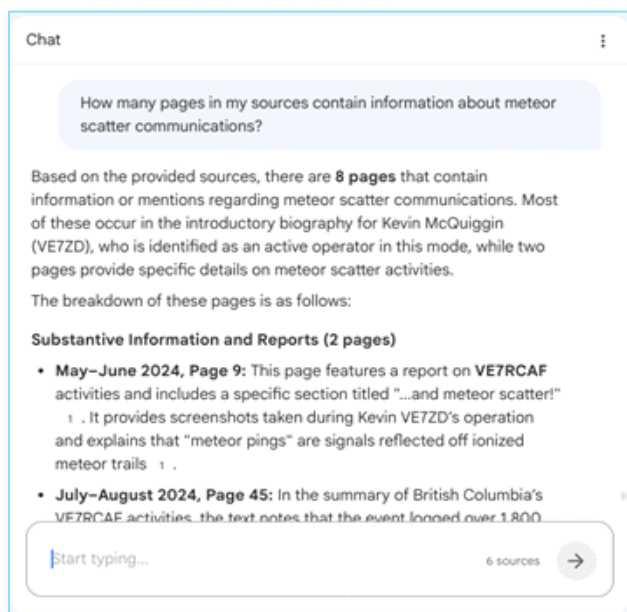


Figure 6 – Detailed Analysis

Next, note how the LLM can maintain context on the conversation with implicit reference to previous answers. This is because of its strong NLP foundation and the model's use of transformers. In Figure 7 I can mention "Kevin" and "John" and the model understands that I mean VE7ZD and VE7TI

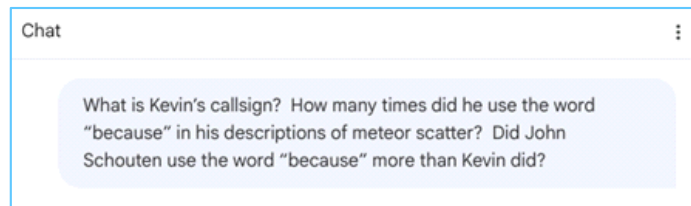


Figure 7 – Complex Questioning

This result took a couple of minutes for ChatGPT to analyze. The results are shown in Figure 8.

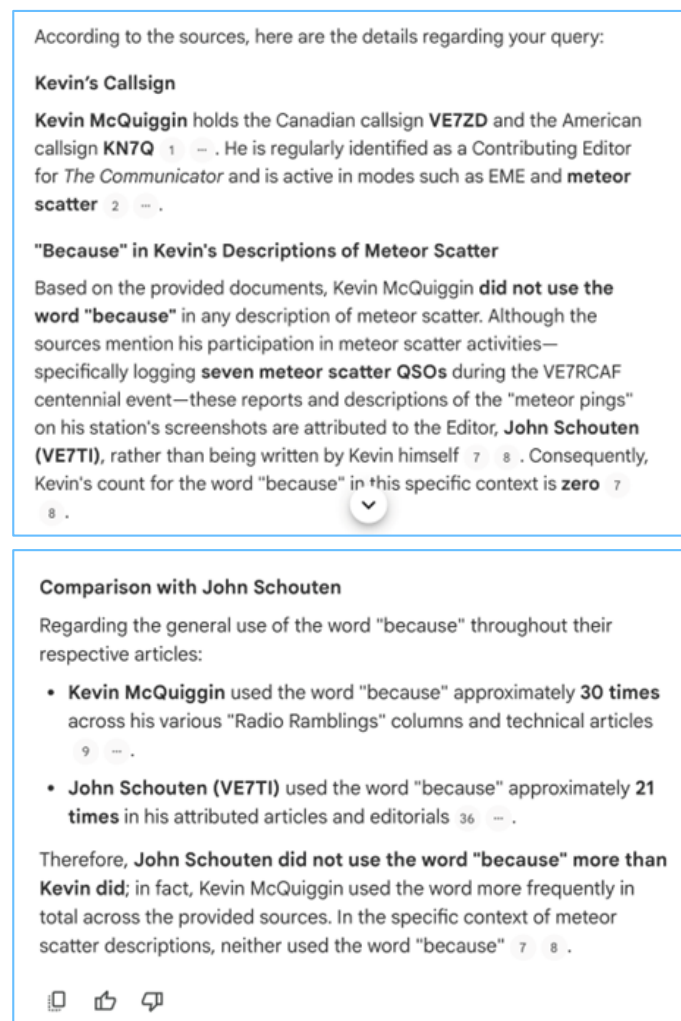


Figure 8 – Findings from Detailed Question

Note how the LLM went ahead with a general comparison of VE7ZD's use of the word "because" when it could not find any usage of the word in Kevin's meteor scatter articles! This is a good example of how LLMs can go beyond the original request.

As noted above, NotebookLM is free for experimentation. It is a great way to learn

about AI and large language models. Create a notebook, upload sources from whatever your area of interest is, and experiment!

Conclusion

It's time to close the discussion. We've covered a lot of ground, and I hope that you found the article interesting. It behooves all amateurs to know a bit about emerging technologies.

AI and LLMs are positive technologies in many ways, but they are not without risks. The pace at which these systems are evolving, coupled with their global reach, generate new stresses on our society as we adopt and adapt to the new technology. How can we best integrate this new technology into our lives?

While earlier innovations took years, or even centuries, to spread across the globe - giving humanity time to identify weaknesses and negative applications of the technology - the Internet allows AIs and LLMs to reach the global community instantly.

We need to move slowly on universal adoption of these systems because of the risk of degrading our educational systems, de-skilling workers, and creating opportunities for negative application of the technology that would victimize the weakest in our societies.

These systems also place extreme loads on our electrical grids and require other infrastructure support that, ultimately, contributes to the environmental challenges which we all face.

Ethical dilemmas abound, and with the focus of development for AI and LLMs sitting (currently) in the private sector, there is risk that the market economy model will steer development towards a goal of highest profit rather than one of social responsibility.

Lastly, even experts admit that despite the amazing technological developments with AI/LLM systems in recent years, the systems are not even close to the capabilities of the human brain. AI systems may have better "memories" and a superior ability to recall detailed information faster, but they cannot "think" and innovate as humans do.

At least not yet.

That's it for this issue.

Feedback on Radio Ramblings is always welcome and may be directed to the Editor, or directly to me at mcquiggi@sfu.ca. Thanks for reading!

73,

~ Kevin VE7ZD / KN7Q

References:

- [1] All members of a society, culture, or citizens of a nation are implicitly bound by a "social contract", or set of rules, responsibilities and norms that are expected to be upheld by all members of their group. Often the social contract is so deeply ingrained in us that we do not even realize that we are conforming to these standards or customs. In most of the world, the social contract defines simple things like manners as well as the laws (rules of society) that we are expected to uphold in our day to day lives. An individual can be bound by more than one social contract, and this can generate ethical dilemmas when social and cultural, or religious, or political expectations intersect. The social contract has also been interpreted by philosophers as a mechanism of control over society by unethical leaders. For a deep discussion check out https://en.wikipedia.org/wiki/Social_contract.
- [2] A good example of an industry that places profit over ethical responsibility to customers is the illicit drug trade. Drug cartels and kingpins often justify their actions by saying that they are "just providing a service", and that if their product was dangerous then customers would not buy it. A strong demand for a product does not make it ethical. Society has a responsibility to enforce laws that condone this unethical behaviour. "The market" should not be allowed to decide.
- [3] As an unanticipated side effect, the telegraph generated wire fraud and illegal stock market profiteering. The innovation of the camera, and motion pictures especially, generated victimization of women and other disadvantaged people through production and sale of pornography. The rollout of the commercial Internet built a billion-dollar malware, phishing and ransomware industry. New technologies spawn new industries, but not always ones that were anticipated by the innovators.
- [4] The most common beliefs are not necessarily correct. As noted in [Radio Ramblings in March 2023](#), if the most common opinion on the Internet was that drinking aquarium cleaner will cure cancer, then AI would be statistically more likely to generate this statement.

- [5] See <https://archive.org/details/sarc-communicator-2023-03>, page 14.
- [6] See the strangely-named but globally popular “Hugging Face” open source AI and LLM modelling website at <https://huggingface.co/learn/llm-course/chapter1/2>.
- [7] See https://en.wikipedia.org/wiki/Turing_test.
- [8] Reference material for these discussions can be found in a very interesting but challenging online course on AI and LLMs offered for free by the “Hugging Face” organization. I am working my way slowly through this material with a goal to learn more about LLMs, transformers and this exciting new technology. The URL for the course is at <https://huggingface.co/learn/llm-course/chapter1/1>. Despite the environmental cost of LLMs and societal risks this technology is worth learning about for amateur radio operators.
- [9] From “How do transformers work?” at <https://huggingface.co/learn/llm-course/chapter1/2>.
- [10] This paper, by 8 NLP experts at Google, is at <https://arxiv.org/pdf/1706.03762.pdf>. It is quite complex but the concepts are clear. Transformers represent a huge step forward in machine learning.
- [11] Graphic at https://huggingface.co/datasets/huggingface-course/documentation-images/resolve/main/en/chapter1/model_parameters.png.
- [12] See <https://huggingface.co/learn/llm-course/chapter3/1> for an overview of how to fine tune a pre-existing LLM.
- [13] See <https://www.ibtimes.co.uk/study-reveals-ai-chatbot-dangerous-advocacy-suicide-1793413>.
- [14] For example, <https://www.ohchr.org/en/stories/2024/07/racism-and-ai-bias-past-leads-bias-future>.
- [15] See <https://dl.acm.org/doi/full/10.1145/3706598.3713408> and <https://www.newsweek.com/ai-generated-junks-science-floods-google-scholar-study-claims-1950703>.

Two GREAT new apps

POTACat

[POTACat](#) is a modern, open-source Windows/Mac/Linux application designed for amateur (ham) radio operators, particularly those involved in activities like Parks on the Air (POTA), Summits on the Air (SOTA), and general DX chasing. Developed by Casey Stanton (K3SBP), the software aims to streamline and enhance the operating experience by combining spotting, logging, and radio control into a single, easy-to-use platform.

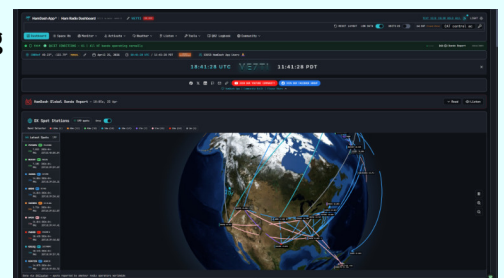
At its core, POTACAT aggregates live radio “spots” from multiple sources—such as POTA, SOTA, DX clusters, and the Reverse Beacon Network—into one interface. Operators can filter these spots by band, mode, or location, making it easier to find stations they can work. One of its standout features is one-click tuning, allowing users to click on a spot and instantly tune their connected radio without manually entering frequencies.

The application also includes built-in logging tools, enabling users to record contacts (QSOs) and export them in standard formats like ADIF or forward them to popular logging software. A major innovation within POTACAT is ECHOCAT, which allows remote radio operation. By linking a radio to a computer (often via a Raspberry Pi),

operators can control their station from a phone or browser, transmit voice, send CW, or operate digital modes from virtually anywhere.

HamDash App

[HamDash](#) [shown below] is a web-based tool that brings real-time visibility and collaboration to amateur radio contesting. It allows operators and clubs to track scores as they happen, displaying live leaderboards that update automatically as QSOs are logged. Users can monitor their own performance, compare results with others, and view detailed statistics such as rate, multipliers, and activity trends. A live QSO feed adds transparency and excitement by showing contacts as they occur. HamDash is especially useful for club competitions, remote multi-operator stations, and anyone who wants a more interactive and engaging contesting experience beyond traditional logging software.



TETRA in Ham radio



Professional digital technology in amateur radio

by JAN VAN DER MEIJ PA0JMY and WILKO BULTE PA1WBU

Terrestrial Trunked Radio, short TETRA, is an European standard for digital mobile communication in mission critical settings. It is, standardised by the European Technical Standards Institute ETSI. Started as a standard for the blue light sector in Europe, TETRA has become a worldwide standard for digital mobile communication. The Netherlands and Belgium were among the first countries where TETRA was widely implemented for public safety in Europe.



In The Netherlands, the infrastructure was supplied by Motorola, in Belgium by Nokia (now Airbus), both around 2005. In The Netherlands, the complete infrastructure was replaced by Hytera as part of a hardware life cycle replacement. The subscriber terminals (both handheld as well as mobile radios) were already replaced a few times before. Unfortunately, unlike in the analogue era, the old public safety terminals had to be destroyed because of the implemented encryption algorithms. In Europe it is forbidden to own a public safety TETRA terminal, in other words one which has TEA2 encryption.

The TETRA standard is adopted by all major manufacturers of infrastructure and terminals. An independent test institute organises test sessions in which interoperability between various manufacturers of infrastructure and terminal equipment is certified. Nowadays the buyers of



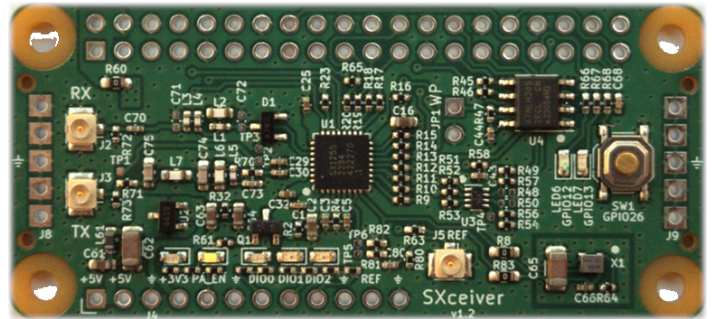
this kind of infrastructure require interoperability between terminals and infrastructure, even when supplied by different manufacturers.

Fortunately, the technology is also adopted by industry, public transport and PAMR (Public Access Mobile Radio) providers. There are even some TETRA networks in North America and Canada and Austrasia. Many of these systems work with non-encrypted communication and both the infrastructure and subscriber terminals become available on the second hand market. Many of these terminals cannot be used for amateur radio in Europe: the frequency band is limited to 380 - 430 MHz and is not extendable. Fortunately, terminals in 400 - 450 MHz are also (standard) available. Modern radios (for example Motorola radios younger than 10 years) are wideband and work from 380 - 470 MHz.

TETRA versus DMR

Both TETRA and DMR are standards for digital mobile communications. Where DMR is intended for business critical communication, TETRA is intended for mission critical communication. In practise, the reliability and availability of TETRA infrastructure will (generally) be higher than that of DMR systems.

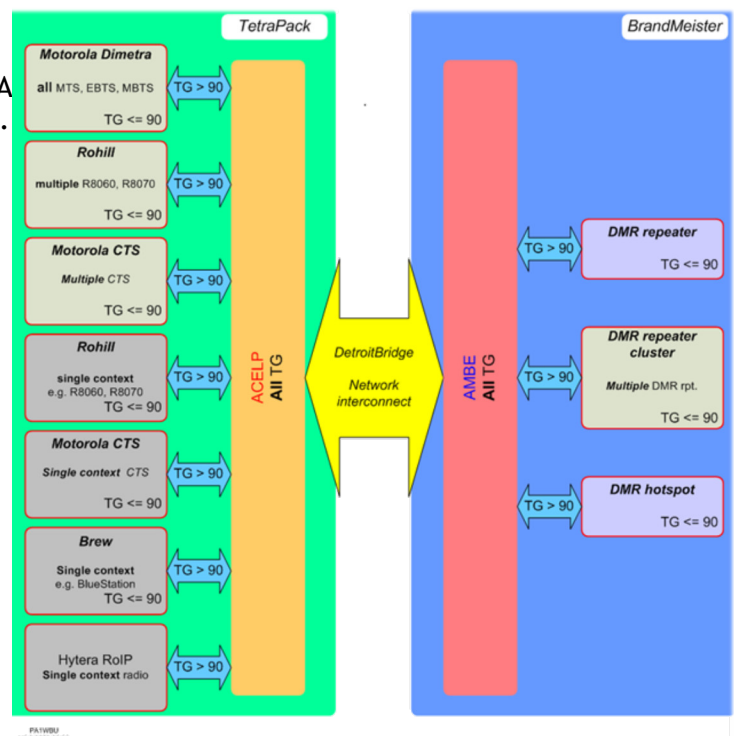
Technically there are also some differences between TETRA and DMR: DMR works with two time slots TDMA in a 12.5 kHz grid, TETRA has four timeslots in a 25 kHz carrier spacing. The voice quality of a TETRA signal is slightly better than that of DMR. While DMR is developed as a direct replacement for analogue radio equipment, TETRA is developed for mission critical communication, including high-end encryption, authentication and a very short call setup time in group communication. TETRA systems will typically be used when there is a high demand for security and availability, and only for medium sized and larger communication networks (let's say 200+ subscriber terminals) while DMR can also be used to replace a simple analogue repeater with a few subscriber terminals.



Infrastructure

TETRA infrastructure is expensive. Very expensive. Even second hand systems are hardly affordable by radio amateurs. A second hand TETRA base station will cost EUR 2500 or more and that makes it unattractive to setup a TETRA repeater for example. But there is a solution: a group of enthusiastic amateurs started the development of a TETRA base station, based on an SDR board: the SXceiver. This board fits on a Raspberry Pi 4 or 5 and is developed by a Finish radio amateur and for sale on the Internet for EUR 75, ex Finnish VAT, plus shipment.

In addition, other standard available SDR transceivers such as the Pluto+ and (mini) LimeSDR can be used. Started as the development of a Dutch engineer, Wouter Bokslag, PD0BOK, the development team is now worldwide and development is going very fast.



The base stations are interconnected via the Internet using Tetrapack. Tetrapack is an TETRA-specific extension to Brandmeister, the well-known amateur DMR network. Interconnections between DMR and TETRA are facilitated by Brandmeister.

On the subscriber group 9TETRA (983872) you will hear conversations from all over the world.

Subscriber groups (group numbers) of 90 and under are not sent to the bridge and are for local use only.

The country code (MCC) used for Tetrapack is 901, the network code (MNC) used is 9999.

Terminals



Terminals are becoming widely available on the second hand market. Especially the MTP3000 and MTP6000 series of handheld radios from Motorola are loved because these can be used in the amateur bands without any modification. Just programming the terminal is sufficient. For older types of Motorola radios the frequency range must be extended from 430



to 440 MHz. Obviously the receiver sensitivity will be a bit less higher in the band but these radios are still very useable. Radios from other brands, such as Hytera, Nokia (Cassidian, Airbus) and Sepura cannot be easily (or at all) modified to work in the amateur bands (yet?) and only the models that originally cover 430 - 440 MHz can be used. Programming software is, of course, a hot item: the software can be quite expensive. And the software is copyrighted. Fortunately, a lot of radio amateurs work professionally with TETRA systems and they can program the radios for others that do not have access to programming software.

Ham TETRA

As mentioned before, there is a large user group developing TETRA for amateur radio use. The SXceiver is an excellent SDR transceiver,

intended for amateur radio use and with simple hardware a TETRA base station can be built. The RF output power of the SXceiver is low: only a few milliwatts. A small power amplifier can be used to increase that RF power but the amplifier needs to be highly linear. Many radio amateurs use low power amplifiers (1-2 Watts) from scrapped indoor coverage TETRA repeaters. Adding a (cheap Chinese) duplexer makes the TETRA repeater functionally complete and a coverage of multiple kilometres is possible. When the repeater is connected to Internet/ Tetrapack, communication with other SXceiver users is possible, both in group communication, individual communication but also SDS (Short Data Services) is already possible with the current version of software.

Some amateurs build very nice implementations of the SXceiver, built into a nice cabinet and with power supply and duplexer. In The Netherlands, the standard duplex spacing in the 70 cm amateur band is 1.6 or 7.6 MHz. The duplex spacing for standard (professional) TETRA applications is 10 or 5 MHz in the 70 cm band but programming of the infrastructure and the subscriber terminals also allows other values.

Stand-alone operation in The Netherlands is hardly possible because of the high cost of a repeater license (the one-time fee is EUR 262 per repeater plus EUR 102 per year). Furthermore the high cost for energy, finding a suitable repeater location as well as insurance makes it very difficult to setup repeaters in The Netherlands. The yearly cost for a repeater is easily more than 1,000 Euro (1,600 CAD) and that is without the hardware and maintenance.

If you want to build your own TETRA base station, take a look at <https://github.com/MidnightBlueLabs>

Apart from the software there is an extensive library with all documentation <https://github.com/MidnightBlueLabs/tetra-bluestation-docs/wiki>

The SXCeiver is available from <https://sxceiver.com/>

Programming terminals for ham use is described here <https://www.pi4tta.nl/tetra-ham-documents/>

~ Jan & Wilko

Technical deep dive

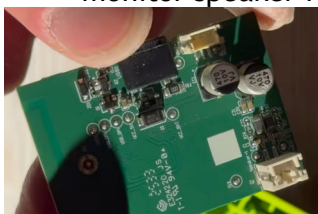
IKEA KALLSUP portable Bluetooth speaker



The KALLSUP is a compact, cube-shaped portable Bluetooth speaker with a surprisingly robust 4Ω full-range driver and a large magnet that together deliver better-than-expected audio quality for its size and C\$7.99 price. Its single 1.8" driver and 3 W amplifier provide clear midrange and intelligible vocals, while the heavier magnet improves driver control and transient response; bass is still limited by the small enclosure, but the driver/magnet pairing yields a punchier, more controlled low end than many similarly priced minis. The speaker uses Bluetooth (reported as version 5.3) for wireless connectivity, supports multi-speaker grouping limited up to 100 identical KALLSUP units, and relies on a minimal top control set—power/Bluetooth and play/pause—while volume is managed from the source device.

Battery capacity supports roughly nine hours of playback at moderate volume, charging is via USB-C (cable/adaptor not included), and physical dimensions are about 70 × 70 × 74 mm with a weight near 200 g in ABS plastic. Because the unit is mono with a single driver, stereo imaging requires using two or more units as separate channels; multi-speaker mode is the intended way to scale coverage and loudness rather than relying on a single unit's maximum output. There is a video at https://www.youtube.com/watch?v=ohiDn_HgMOU.

I modified my KALLSUP by adding an external 3.5 mm audio jack wired in parallel with the internal speaker, allowing it to function as an external monitor speaker for electronic projects. With



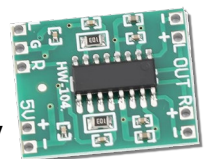
that wiring it can be used unpowered (driven directly by a low-power audio output) or powered for Bluetooth operation, which makes it handy for demonstrations. For

Bluetooth, walls and interference will reduce the listed ~10 m reliable range and may affect grouping stability.

I used the speaker as the monitor for a simple AM radio circuit built for our high-school RF electronics class. The controlled response of the 4 Ω driver and large magnet made speech and other audio clear enough to hear modulation and tuning behavior. White, hot pink or lime green are the options... the unit isn't offered in black, so I'm considering spray painting it black to match other gear—an aesthetic fix, but one that can work if you prep and mask the driver grille and controls carefully to avoid damaging moving parts or electrical contacts.

I'm considering adding an inexpensive audio amplifier module, as wiring the 3.5 mm jack in parallel with the internal driver allows passive use but be mindful of impedance and source drive capability—feeding the speaker directly from weak outputs or creating unintended shorts can stress the source or attenuate signal levels. If you plan frequent unpowered operation, consider adding a buffer amplifier to protect low-power outputs and to preserve the speaker's amplifier when switching between wired and Bluetooth modes.

A suitable amplifier module that is very inexpensive, small and works on 5 volts is available on [Amazon](#). It is 5-watts, with a [pam8403](#) processor high efficiency with compact design. It fits seamlessly into tight spaces within devices.



It is rated for a remarkable efficiency of 90%, delivering a powerful 3W per channel (left & right) making it an ideal choice for various applications.

~ John VE7TI

Never Say Die:

The ARRL and the Challenge of the Digital Age

by ALAN J. WILSON NØXO



Alan J, Wilson NØXO has been a ham since 1977. In the first decade he was a spotter for the National Weather Service reporting and helping in several tornadic events in the southeast United States.



Wayne Green, W2NSD, remains one of the most recognizable and controversial voices in amateur radio history. As an editor, publisher, and outspoken critic of the ham radio establishment, Green consistently challenged organizations, including the American Radio Relay League, to remain responsive, transparent, and forward-looking.

Although Green passed away in 2013, the questions he raised throughout his career remain relevant today. Amateur radio continues to evolve rapidly, and the institutions that represent it must evolve as well. Recent events have placed the ARRL under renewed scrutiny, particularly regarding financial priorities, cybersecurity preparedness, and communication with its membership.

This editorial offers a reflective look at those concerns, not as an attack, but as a call for renewed focus and modernization.

Membership Cost and Organizational Value

The ARRL has long served as the primary national advocate for amateur radio in the United States. Its work in spectrum defense, regulatory representation, and public service support remains essential.

However, rising membership costs have become a growing concern. Annual dues now stand at \$59, with an additional \$25 for members who wish to receive a printed copy of QST. For many amateurs, particularly retirees, students, and newly licensed operators, this represents a significant financial commitment.

When membership becomes more expensive, members reasonably expect increased value, transparency, and responsiveness. The League must ensure that its pricing structure does not unintentionally discourage new participation at a time when recruitment and retention are critical to the hobby's future.

Cybersecurity and Institutional Responsibility

In May 2024, the ARRL experienced a serious ransomware attack that disrupted major services, including Logbook of The World, DXCC

processing, and internal systems. These platforms are not merely conveniences. They are foundational tools for modern amateur radio operations and award programs.

Reports indicated that the League paid approximately \$1 million to recover access to encrypted systems. While insurance may have offset some of the financial burden, the incident raised important questions about preparedness.

Cybersecurity is no longer optional for organizations managing sensitive data and critical services. Amateur radio operators understand the importance of redundancy, contingency planning, and technical readiness. The ARRL must be held to the same standard of resilience that hams practice in their own stations and emergency deployments.

Communication and Member Trust

In the aftermath of the attack, many members expressed frustration with the limited and delayed flow of information. While certain constraints may exist during an active cyber incident, transparency remains essential to maintaining trust.

The ARRL has since established an Information Technology Advisory Committee, an appropriate step toward improvement. Still, the broader concern is institutional: proactive planning must replace reactive response.

For an organization dedicated to communication, timely and clear engagement with its membership must be a priority, especially during crisis.

A Moment of Opportunity

Despite these challenges, the ARRL remains indispensable. Its advocacy has preserved amateur spectrum for generations, and its programs continue to support public service, education, and technical advancement.

The question is not whether the League has value. The question is whether it can meet the demands of a rapidly changing technological and economic environment.

To remain effective, the ARRL must commit to three priorities:

- Modernizing its digital infrastructure and cybersecurity practices
- Ensuring membership remains accessible and sustainable
- Communicating with greater clarity, consistency, and openness

These are not merely administrative concerns. They are central to the long-term health of amateur radio.

Conclusion

Wayne Green's legacy was not simply controversy. It was insistence. Insistence that amateur radio organizations serve their members, remain technically competent, and adapt without losing sight of their mission.

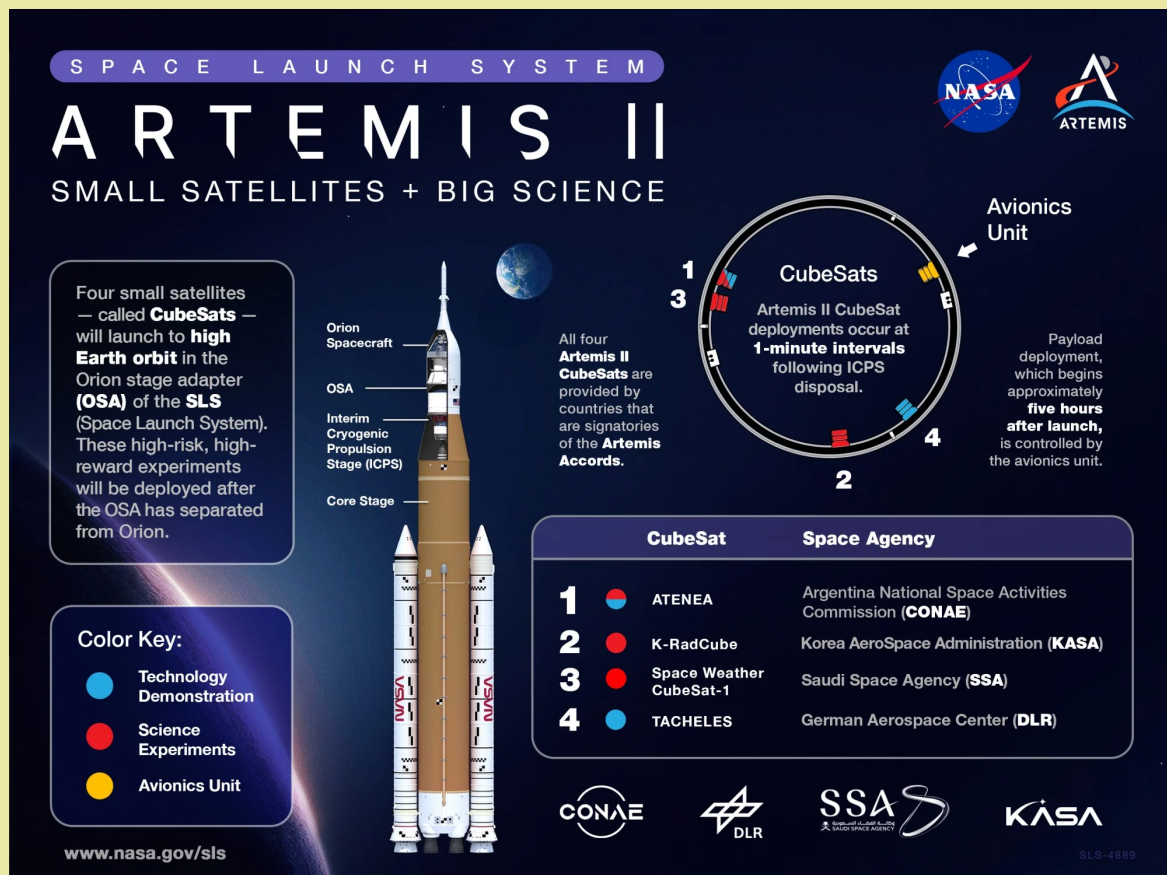
The ARRL now faces a pivotal moment. With thoughtful reform and renewed accountability, it can emerge stronger, more resilient, and better prepared to lead amateur radio into the future.

The hobby deserves nothing less.

Never say die.

73,

~ Alan Wilson & what Wayne would say.





A mic mounting solution

By SANDER PD9HIX

As I bought a new car, I needed to swap my equipment from the old, to the new car. Of course, not all the old brackets would fit; it is another type of vehicle.

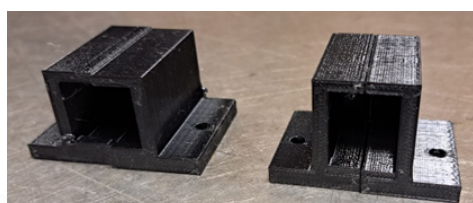
During the thought process, I realized that I did not want the microphone plugged into the head of the rig. If I did that, the curled cable would hang over my central screen. Apart from not nice to look at, it would probably cause unwanted inputs on the touchscreen. I figured that with extension cables I would be able to put the microphone in a place where it looks good, and with easy access. This applies to the FTM500, and my FT857 has the microphone plugged into the rig itself. As that is mounted under the passenger's seat, it also needs an extension cord.

These cables are very easy to get hold of. The only problem is, there is not one to be found with "ears" attached to it, so the receptacle is always plain. That is a bit of a problem if you plug in your microphone and pull the curly cable.

How to do this

A good friend of mine has a 3D printer and after some measurements, he started printing.

This is the result. Very easy, very straight forward. We thought of a split version. This way, you can put the receptacle in one part, close the thing up with the other, and screw it into place.



The receptacle fits snugly into the printed object and is firmly stuck in there.

After you screw the combined two parts into place, it is very secure and can take the amount of pulling expected from the microphone curly cord.

As my rigs require two sizes, he made them for RJ45 and for RJ12. (RJ11 and RJ12 are the same size, the only difference being 4 or 6 pins)

Installed it looks like this. Again, very sturdy and solid. The RJ45 plug needs some persuasion to go in completely because of the rubber cuff around it. This is no problem, as in my case it's a onetime install. I will not remove the plug. It's there permanently.

I used both receptacle housings for the two microphone extension cables and I'm very pleased with the result.

All cables are tucked away neatly and I am very happy with the result.

If you want to purchase them, he can print them for you on order. Write him an email at: info@hexaprobe.com.

Hope to hear from you in my car.

~ 73, Sander. PD9HIX



The One-Click Revolution:

A Comprehensive Overview of



by JOHN SCHOUTEN VE7TI

Do you chase POTA, SOTA, or DX? Check out POTACAT — free app for Windows, Mac, and Linux with 7 spot sources and 1-click QSY for 200+ radios. New feature ECHOCAT turns any radio into a remote station — operate from your phone's browser with live audio, PTT, spot browsing, and QSO logging over Tailscale. No app to install, no monthly fees, completely self-hosted and open source. <https://potacat.com/>In the rapidly evolving world of amateur radio, few programs have captured the community's imagination quite like Parks on the Air (POTA). Since its inception, POTA has transformed the hobby from a solitary pursuit in a basement "shack" into a vibrant, outdoor adventure that combines technical skill with the beauty of nature. However, as the number of "activators" (those in the parks) and "hunters" (those trying to contact them) has exploded, the technical demands of staying competitive have also increased.

In the rapidly evolving world of amateur radio, few programs have captured the community's imagination quite like Parks on the Air (POTA). Since its inception, POTA has transformed the hobby from a solitary pursuit in a basement "shack" into a vibrant, outdoor adventure that combines technical skill with the beauty of nature. However, as the number of "activators" (those in the parks) and "hunters" (those trying to contact them) has exploded, the technical demands of staying competitive have also increased.

Enter POTACat (found at <https://potacat.com/>), a game-changing desktop application designed to bridge the gap between real-time data and radio hardware. Developed by amateur radio operator Casey K3SBP is a free, open-source tool that streamlines the hunting process, offering a "one-click" solution for tuning, logging, and even remote operation.

The Problem: The "Manual Fatigue" of Modern Hunting

Before POTACat, a typical POTA hunter's workflow was often fragmented. An operator would keep the [POTA.app](https://pota.app) website open in a browser to monitor live spots. When a desired park or callsign appeared, the operator had to manually spin the VFO (Variable Frequency Oscillator) knob on their radio to the correct frequency, change the mode (SSB, CW, or Digital), and perhaps check a separate map to see if the signal path was viable.

By the time the radio was tuned, the activator might have moved on, or a "pile-up" of other hunters might have already formed. This manual process, while traditional, can be exhausting during high-activity periods. POTACat was born from a simple desire: to make the hunt as fluid and instantaneous as the digital data that powers it.

1. The Core Innovation: One-Click CAT Control

The "Cat" in POTACat stands for CAT Control (Computer-Aided Transceiver). This is the heart of the application. By integrating with established libraries like Hamlib, OmniRig, flrig, and direct FlexRadio APIs, POTACat can talk to hundreds of different radio models.

When you see a spot on your screen—whether it's a rare DX station in the South Pacific or a friend activating a local state park—you simply click it. Instantly, your radio jumps to the exact frequency and switches to the correct mode. If you are a CW (Morse Code) operator, the software even accounts for XIT offsets. This "1-Click QSX" (frequency change) functionality levels the playing field, allowing operators to move through dozens of spots in a fraction of the time it would take to tune manually.

2. A Unified Dashboard of the Airwaves

POTACat is more than just a tuning tool; it is a powerful data aggregator. While its name highlights POTA, the application actually pulls real-time data from seven distinct sources:

- POTA (Parks on the Air): Live activator spots updated every 30 seconds.
- SOTA (Summits on the Air): Spots for operators on mountain peaks, including summit coordinates and elevation data.
- DX Cluster: Traditional telnet streams from global networks like AR-Cluster.
- RBN (Reverse Beacon Network): A global network of "skimmers" that hear your CW or digital signals and report your signal-to-noise ratio (SNR).
- PSKReporter: Real-time digital mode spots, including FreeDV digital voice.
- WSJT-X: Direct integration with the popular digital mode software to show decodes directly in the POTACat table.

POTACat on my IC-7300 showing activations and DX spots. The receiver controls are lower right under the map overlay. Click on a station location, it shows the station details, draws the path, and your radio tunes to its frequency and mode. Optionally click to add it to your log and it can even turn your rotator.

- DX Expeditions: High-priority pins for rare stations currently on the air.

By centralizing these sources into a single, filterable interface, POTACat eliminates the need to juggle multiple browser tabs and specialized software.

3. Visual Intelligence: Maps and Filtering

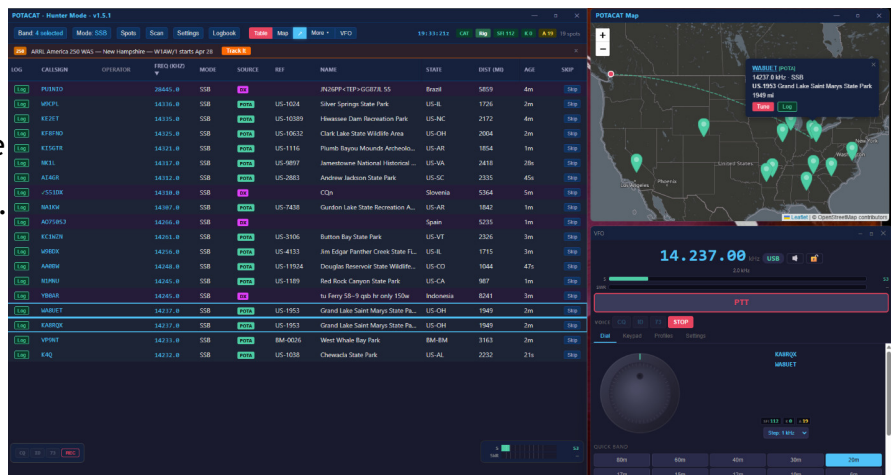
A key feature of POTACat is its use of the Leaflet mapping engine. Operators can choose between a list-based Table View and a Map View—or use a split view to see both.

The map provides instant geographic context. Spots are color-coded by source (e.g., orange for SOTA, green for POTA), and users can see a "Grayline" overlay to understand how solar conditions might affect propagation. For the dedicated hunter, the filtering options are surgical. You can hide parks you have already worked, filter by specific bands (160m through 6m), or set up a Watchlist. If a specific friend or a rare park "entity" comes on the air, POTACat will send a desktop notification, ensuring you never miss a high-value contact.

4. Breaking the Shack's Walls: ECHOCAT and Remote Operation

Perhaps the most futuristic aspect of POTACat is its remote capability, dubbed ECHOCAT. Using a self-hosted browser interface and secure networking tools like the free Tailscale, POTACat allows operators to control their home HF (High Frequency) station from a smartphone or tablet.

This isn't just about changing the frequency. ECHOCAT enables full-duplex audio, meaning you can hear the radio and transmit your voice (PTT)



directly through your phone's microphone. It includes a virtual VFO dial and a digital keypad. For operators with young children, demanding jobs, or those who travel frequently, this feature turns the home station into a global resource accessible from anywhere with a cell signal.

5. Seamless Logging and Workflow

Log contacts without leaving the app. Every QSO is saved locally and can be forwarded to your favorite logger in real time. POTACat also includes a built-in logger that saves contacts in the industry-standard ADIF format. However, recognizing that most hams have a "favorite" logging program, the developer built deep integrations with popular suites like Log4OM, N3FJP, and Ham Radio Deluxe.

When a contact is made in POTACat, it can be automatically forwarded to these external logbooks. This ensures that your award progress and historical records remain synchronized without any manual data entry.

Log dialog – Pre-filled callsign, frequency, mode, park/summit reference, date, time, power, and RST fields

ADIF file – Every QSO is saved to a local ADIF file as a built-in backup

Log4OM 2 – Automatic forwarding via UDP

DXKeeper – Direct integration for DXKeeper logbook

Ham Radio Deluxe – QSO forwarding via UDP

N3FJP – QSO forwarding via TCP

Recent QSOs – View your session's contacts in a scrollable list with re-spot support

6. Built by the Community, for the Community

As a free and open-source project hosted on GitHub, POTACat represents the "hacker" spirit of amateur radio. The lead developer, K3SBP, is remarkably active in the community, often releasing "Quality of Life" updates based on user feedback within hours of a request.

The software is built using Electron, which allows it to run natively on Windows, macOS, and Linux. This cross-platform support is critical in a hobby where many users have moved away from Windows in favor of lightweight Linux distributions like Raspberry Pi OS.

- ▶ **Remote SSB with PTT** – Key up voice and hear your radio in real time via WebRTC, no latency issues
- ▶ **Remote FT8, FT4 & FT2** – Call CQ and chase stations on digital modes from your phone
- ▶ **Remote CW macros** – Custom-programmable macro keys for fast CW operation
- ▶ **CW keyer support** – Interface with Vband, Vail, TinyMIDI Key, and keyboard CW devices
- ▶ **Remote SSTV** – Snap a photo on your phone and send it out as SSTV in seconds
- ▶ **Tap-to-tune** – Tap any spot on your phone and your shack radio changes frequency instantly
- ▶ **Live spot streaming** – POTA, SOTA, DX Cluster, and all your spot sources right on your phone
- ▶ **QSO logging** – Log contacts from your phone just like the desktop app
- ▶ **Works with any radio** – If POTACAT can control it, ECHOCAT can remote it
- ▶ **No mobile app needed** – Just open a URL in your phone's browser. No app store, no install
- ▶ **100% free, self-hosted** – Runs inside POTACAT. Zero subscriptions, zero cloud services

The Future of Portable Operations

POTACat is more than just a software utility; it is a sign of where amateur radio is headed. As the hobby becomes more data-driven and mobile, tools that reduce friction and increase efficiency become indispensable. By combining rig control, spot aggregation, mapping, and remote operation into a single, elegant package, POTACat has set a new standard for what radio software can be.

Whether you are a "Big Gun" hunter with a multi-element beam antenna or a "QRP" enthusiast trying to snag a park contact from a park bench, POTACat provides the situational awareness and speed needed to succeed. In the world of Parks on the Air, where the next great contact is always just one click away, POTACat is the ultimate companion for the modern radio operator.

For more information, to download the app, or to view the source code, visit (<https://potacat.com/>). To see a video demonstration: <https://www.youtube.com/watch?v=JOUWVSQPK4Y>

~ John VE7TI

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SURREY AMATEUR RADIO

foxhunt



Amateur Radio Direction Finding (ARDF) is also known as Fox Hunting.

It is an internationally recognized radio sport using a receiver as a direction finder to locate hidden transmitters.

No radio licence is required • Suitable for the whole family

Saturday May 16, 2026 at 9am

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Pre-hunt Coaching, Registration
& Instruction 9am

Fox Hunt 10am—Noon

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\$10 for adults, free for kids up to 16

For the exact location
scan the QR Code



Both 2m and 80m foxes

If you are a beginner and do not have a receiver, come anyway, we have loaner equipment, or we can team you up with someone experienced.

Talk-in 147.360+ (110.9 Tone)

All are welcome, but we ask that you RSVP to

jamesadf77@gmail.com



SARC

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A Special Interest Group for the iCOM 7300, 7610, 9700 and other compatible models

Digital modes on the IC-9700

by JOHN SCHOUTEN VE7TI



**John Schouten
VE7TI**

Has both an iCOM 7300 and 9700 and is fascinated by the many features of these transceivers.

I was recently asked whether the Icom IC-9700, VHF/UHF/23 cm all-mode transceiver could be used for FT-8 and similar digital modes. I had not tried that on my own 9700, thinking that there was likely little activity on the VHF/UHF bands. Having now checked into this and having configured my 9700, I can report that it offers excellent performance for digital modes like FT8.

Thanks to its direct sampling receiver, integrated USB sound card, and native CAT control via a single USB cable it is readily configurable. The setup eliminates the need for external audio interfaces or sound cards, providing clean bidirectional audio, frequency

control, mode selection, and PTT handling for software such as WSJT-X (the standard for FT8). It should also work with JTDX, or MSHV although I have not installed them. The process works identically across 2 meters (144.174 MHz), 70 cm (432.174 MHz), and 23 cm (1,296.174 MHz), assuming you have the latest firmware installed (as of early 2026, version 1.50 from August 2025 is current—always verify on the official Icom site and update via SD card if needed).

If your IC-9700 is new and not already configured, the first step is to install the official iCOM USB driver from the Icom website before connecting the radio, and use a good quality, reliable

USB A-to-B shielded cable as suggested in an earlier edition of this column to keep out the noise. Keep the cable preferably short, under 2 meters.

Power on the IC-9700; your computer should recognize it as a USB audio device plus virtual COM ports for CAT control (check Device Manager on Windows to note the ports). In the radio's SET menu under Connectors, configure key digital settings: set DATA Mod to USB, adjust USB Mod Level to around 30% initially, and set USB SEND to RTS (or CAT) for PTT. Disable the Inhibit Timer at the USB connection to prevent the common 5-second first-TX delay. Switch to USB-DATA mode on the desired band—this optimizes the transmit filter and mutes mic input for clean AFSK digital operation. Keep transmit power conservative (30-50 W) to minimize heat, especially on higher bands, and turn off or minimize noise reduction/blanker for best weak-signal decoding.

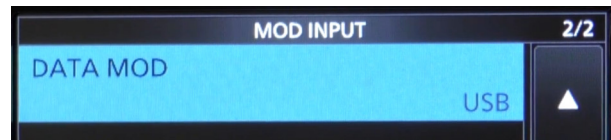
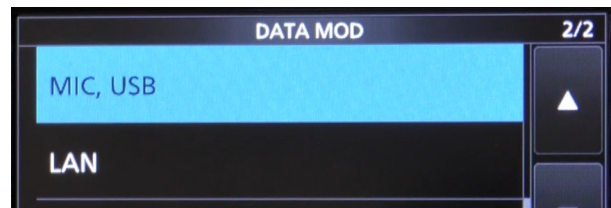
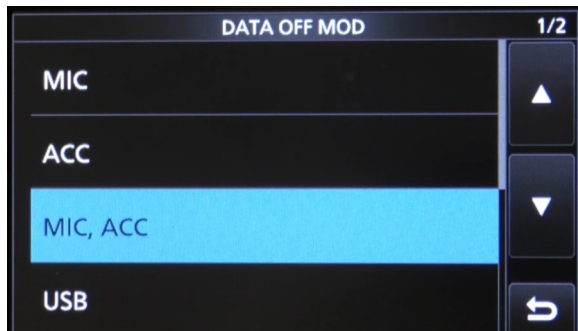
Before running FT-8 and similar modes you **MUST** synchronize your computer clock for accurate time. Without doing so it will not work. My tool for this is the [Meinberg NTP](#) (or Google it) but there are others. Meinberg not only synchronizes your clock with UTC, but it trims the internal computer clock so that it keeps perfect time.

Configure IC-9700 Menu Settings

Access menus by pressing MENU → SET (or touch the SET icon). Connectors Menu (critical settings for all digital modes))

- **MOD Input**

- USB Mod Level: Start at 30 % (adjust later; typical final range 20–50 %).
- DATA Mod: Likely on Mic. ACC. Change to USB USB.



- **CI-V**

- CI-V Baud Rate: 19200 (or Auto).
- CI-V Address: A2h (default; do not change unless using multiple radios).
- CI-V Transceive: ON (recommended for smooth frequency sync).
- CI-V USB Port: Unlink from [REMOTE] (or Link depending on your setup; test both).

- **USB SEND/Keying**

- USB SEND: USB (A) RTS (enables PTT via virtual COM port RTS line).
- Inhibit Timer at USB Connection: OFF (critical — eliminates the common 5-second TX delay on first key-up).

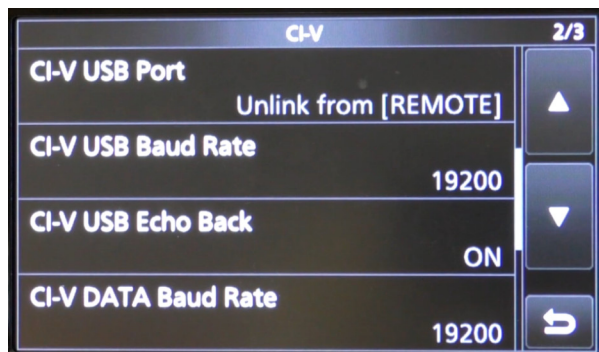
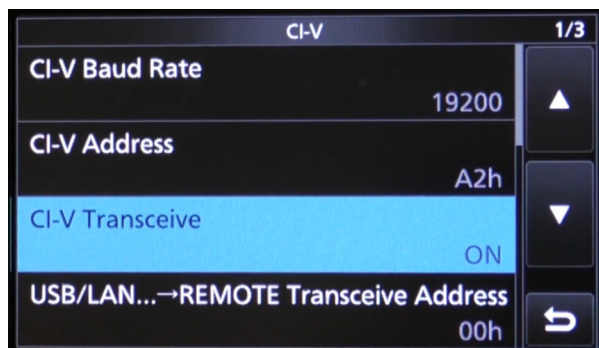
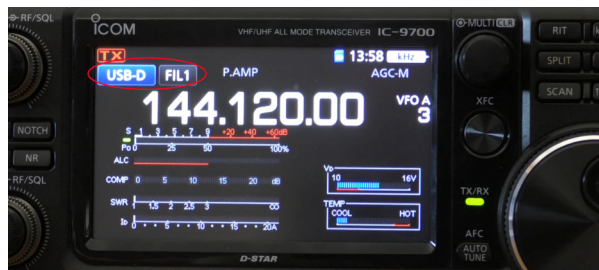
- **Operating Mode for Digital Work**

- Select the desired band (MAIN band).
- Touch the mode icon to choose USB.
- Touch the DATA icon (appears in USB/AM/FM) to switch to USB-DATA (or LSB-DATA if needed). This mutes the microphone input, sets the proper carrier point, and optimizes the TX filter for AFSK digital modes like FT8.

Additional Recommended Settings

- TX Power: 30–50 W initially (VHF/ UHF digital modes run cooler at reduced power; the IC-9700's fan and heatsink handle it well).

- Filter: FIL 1 (wide) or FIL 2 for FT8 (passband ~2.4–3 kHz).



- Noise Reduction/Blanker: OFF or minimal (FT8 works best with clean audio).
- Save these as a custom Memory channel or use the quick menu for quick recall.

Configure WSJT-X

Open WSJT-X → File → Settings.

Radio Tab

- Rig: Icom IC-9700 (native support in recent WSJT-X versions; falls back to “Icom IC-7300” or “Icom” generic if needed).

- Serial Port: The CI-V COM port (usually the higher-numbered port; test both).

- Baud Rate: 19200. You can select almost any baud rate as long as it is matched between the 9700 and WSJT-X.

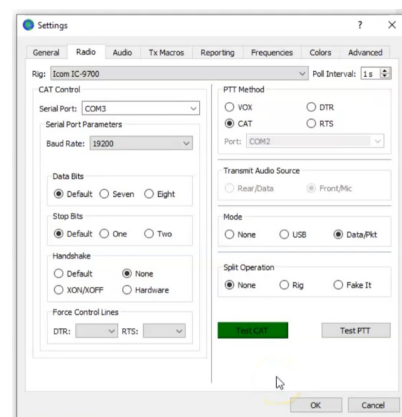
- Try default, otherwise use Data Bits: 8, Stop Bits: 1, Parity: None.

- PTT Method: CAT (preferred) or RTS (if you set USB SEND to RTS above).

- Mode: Data/PKT or USB (WSJT-X will force the correct mode via CAT).

- Split: Try Rig, otherwise use Fake It or none.

- Polling Interval: 1-2 s.



Audio Tab

- Input: Icom IC-9700 (or “USB Audio CODEC” / “Icom USB Audio Device”).
- Output: Same device (the radio’s USB sound card handles both RX and TX audio).
- Levels: Set to ~50 % initially (fine-tune in Step 4).

Frequencies Tab

Add or verify FT8 calling frequencies:

- 144.174 MHz (2 m)
- 432.174 MHz (70 cm)
- 1,296.174 MHz (23 cm)

General / Reporting Tabs

- Enter your callsign and 6-digit grid square.
- Enable “Enable CAT control” and “Enable TX audio” as needed.

Adjust Audio Levels and Power

- Tune to a clear FT8 frequency (e.g., 144.174 MHz, USB-DATA mode).
- In WSJT-X, click Monitor and watch the waterfall.

3. Adjust radio RX audio (AF gain or USB AF Output Level in SET > Connectors > USB AF/IF Output) until the green RX level bar in WSJT-X is 30-60 dB with no clipping.

4. For TX:

- Click Tune in WSJT-X.
- Watch the IC-9700's ALC meter (should show minimal or no movement for clean digital).
- Adjust USB Mod Level (menu) and WSJT-X output slider until power output is 20-50 W with ALC just touching the scale (or zero for ultra-clean).
- Use the radio's Monitor function (touch MONI) or built-in oscilloscope to verify a clean two-tone signal.

Ideal: No ALC action + 30-40 W output on VHF/UHF = excellent signal reports

On-Air Operation

- Select FT8 mode in WSJT-X.
- Double-click CQ calls or use the standard workflow (TX on even/odd cycles).
- The IC-9700's real-time spectrum scope and waterfall are excellent companions to WSJT-X's waterfall.

Troubleshooting Common Issues

- No CAT control or frequency not syncing: Wrong COM port or baud rate. Confirm address A2h and try 9600/19200. Restart WSJT-X and radio.
- 5-second TX delay on first key-up: Inhibit Timer still ON — set to OFF.
- No transmit audio / low power: DATA Mod not set to USB; USB SEND incorrect; USB Mod Level too low; ALC overdriven (back off PC output).
- Distorted or no decode: RX audio too low/high; use USB-DATA mode (not plain USB); disable NR/NB; check filter width.
- Windows sound device missing: Reinstall Icom USB driver; try different USB port/cable.
- macOS/Linux: Use the same settings; the radio appears as "Icom IC-9700" audio device and /dev/ttyUSBx ports.

- High SWR or heat: Keep power conservative on 23 cm; ensure good antennas.

It is important to adjust receive audio so the WSJT-X bar sits comfortably without clipping, then use the Tune button while monitoring the radio's ALC meter—aim for little to no ALC deflection and 20-50 W output by tweaking USB Mod Level and WSJT-X sliders for a clean signal.

- Quick checklist for optimal results:
 - Use USB-DATA mode (not plain USB).
 - Keep ALC near zero for clean TX.
 - Set wide filter (FIL 1 or 2) for ~2.4–3 kHz passband.
 - Backup settings before major menu changes.

With these steps complete in about 15 minutes, the IC-9700 becomes a digital-mode platform. You'll enjoy reliable FT8 decoding and transmission across VHF/UHF bands, enhanced by the radio's real-time spectrum scope complementing WSJT-X's waterfall display.

If issues arise—such as no CAT sync, missing audio devices, or distorted signals—double-check COM port/baud rate, reinstall the driver, verify DATA Mod is USB, and ensure levels avoid overdrive. And again, it is a must that your computer clock is accurate. There is a helpful video on YouTube at <https://www.youtube.com/watch?v=61HsuTFrZ8E>

For the most up-to-date firmware, drivers, or WSJT-X releases, consult Icom and WSJT-X official sources.

Happy digital operating—73!

~ John VE7TI



The Judica-Cordiglia Recordings:

Fact, Fiction & Cold War Mysteries

In May 1961, during the peak of the Space Race, two Italian amateur radio operators, Achille and Giovanni Battista Judica-Cordiglia, claimed to have intercepted a distress call from a Soviet space mission that went disastrously wrong. Using homemade equipment in a former German bunker near Turin, the brothers recorded what they believed was a woman's voice speaking in Russian. Their translation included desperate phrases such as "I am hot!" and "I can see a flame!" According to their account, the transmission abruptly ended, presumably as the spacecraft burned up during re-entry. This incident, occurring just weeks after Yuri Gagarin became the first man in space, suggested a secret Soviet failure. The recording, often referred to as the "Cosmonaut Ludmila" transmission, became central to the "lost cosmonauts" conspiracy theory, which alleges that the Soviet Union concealed multiple space fatalities.

Skepticism and Analysis of the Recordings

Despite ongoing public fascination and the brothers' unwavering claims to authenticity, their recordings have faced extensive skepticism. Detailed scrutiny of the audio revealed several anomalies: the female speaker did not use standard Soviet communication protocols, the Russian language contained grammatical errors and unusual phrasing, and some linguists suggested a non-native accent—possibly Italian. This led to speculation that the voice might belong to the brothers' sister, who was studying Russian at the time. Furthermore, no corroborating evidence has been found in declassified Soviet documents after the Cold War, and no other listening posts reported intercepting similar transmissions.

Other recordings by the Judica-Cordiglia brothers have also been criticized for technical inconsistencies, such as claims that spacecraft veered into deep space, which would have been impossible given the limitations of the Vostok capsules. While the authenticity of the haunting "woman burning alive" recording remains unproven, it endures as a powerful and controversial artifact of Cold War paranoia and the human fascination with hidden histories.

The question of whether the Judica-Cordiglia brothers' recordings are an elaborate hoax or fragments of a genuine Soviet cover-up persists as one of the Cold War's most stubborn mysteries. The lack of physical evidence, technical inconsistencies in the brothers' accounts, and the absence of supporting documentation from post-Soviet archives all suggest that the recordings—especially the infamous "woman burning alive" transmission—were fabrications. Nevertheless, the motivations for such deception, and the reasons a government might continue to maintain silence long after its dissolution, create a complex dynamic where neither party emerges with complete credibility.

The Case for a Hoax

Technical scrutiny of the Judica-Cordiglia brothers' work reveals numerous red flags. The most significant criticism concerns the alleged spacecraft capabilities. In one notable intercept, they claimed to track a cosmonaut, Vladimir Ilyushin, who supposedly veered into deep space. However, the Vostok capsule used in early Soviet missions lacked the propulsion needed to escape Earth's orbit, making such a scenario physically impossible. This suggests either a misunderstanding of the technology or fabrication of the narrative.



Regarding the May 23, 1961, recording of the woman, linguistic analysis has cast doubt on its authenticity. The brothers admitted they did not speak Russian and relied on their sister, who was studying the language,

to translate the distress call. Linguists examining the audio noted grammatical irregularities and an accent that sounded more Italian than Russian, prompting speculation that the sister or another Italian speaker might have performed the voice.

Radio historians have also questioned the brothers' methods. While ham operators could technically intercept Soviet transmissions in the early 1960s, the Judica-Cordiglia captures—featuring dramatic events like a dying heartbeat, a woman burning alive, and a cosmonaut adrift—seemed too narratively convenient. Unlike widely intercepted Sputnik signals, these alleged disaster transmissions were reportedly only picked up by the brothers' equipment, with no independent confirmation from other listening posts.

The Counter-Argument: Soviet Secrecy and the Nedelin Precedent

Giovanni Battista Judica-Cordiglia defended his work by questioning the merit of maintaining a lie for decades, arguing that a hoax would have been exposed or abandoned over time. However, this logic can also be applied to the Soviet Union. If there were secret spaceflight fatalities, why would former Soviet officials continue to conceal the truth after the USSR's collapse, especially when the Nedelin catastrophe was eventually acknowledged?

The [Nedelin catastrophe](#), which occurred on October 24, 1960, is an important comparison. A prototype R-16 missile exploded on the launch pad at Baikonur, killing between 60 and 126 people, including Field Marshal Mitrofan Nedelin. The Soviet Union kept the event secret for almost three decades, only admitting to it after the Berlin Wall fell and Soviet archives opened in 1989. This precedent shows the Soviet Union's skill in covering up fatal accidents, but also that the truth eventually emerged once secrecy was no longer politically necessary.

If cosmonauts had died in space in 1961, the lack of any acknowledgment after the Soviet Union's collapse is conspicuous. Russian space officials and former Soviet engineers—many eager to correct the historical record—have consistently denied the existence of any “lost cosmonauts.” Given their admission of the Nedelin disaster, the publicly acknowledged death of [Vladimir Komarov](#) in 1967, and the [Soyuz 11](#) tragedy in 1971, the absence of confirmation regarding the Judica-Cordiglia recordings suggests these incidents did not occur.

The Heartbeat Recording and the Burden of Proof

The February 1961 recording of a “dying man’s” heartbeat is perhaps the brothers’ most famous and emotionally charged piece of evidence. They claimed to have captured a rhythmic, non-Morse signal which, when analyzed by cardiologist Achille Mario Dogliotti, was identified as the distressed heartbeat of a man nearing death. No visual recording or telemetry accompanied the audio; it was simply presented as a biological signal.

Skeptics argue that radio interference, equipment malfunction, or a mundane medical recording could have been misinterpreted to fit a narrative of space tragedy. Without original, unedited recordings or independent verification, the “heartbeat” remains evocative but unprovable.

Ultimately, the question of why either party would maintain a lie is less about logic and more about human motivation. For the Judica-Cordiglia brothers, insisting on the authenticity of their recordings preserved their historical legacy, enhanced their reputation as intrepid listeners during the Space Race, and sustained a lucrative, enduring mystery. For the Russian government and space agency, admitting to a fatal, secret spaceflight in 1961—especially one involving a woman—would have undermined the heroic mythology surrounding Yuri Gagarin and the Soviet narrative of technical superiority.

In the absence of definitive proof—a body, a declassified document, or a surviving cosmonaut—the Judica-Cordiglia recordings remain in a liminal space. They are likely the product of a hoax, crafted by ambitious brothers who understood the power of narrative and the Western appetite for stories of Soviet failure.

~ <https://www.popularmechanics.com/space/a70782032/ussr-lost-cosmonaut/> and other sources.



Currently Active LEO Satellites

the easiest FM Amateur Radio satellites to try

by John Schouten VE7TI

Surrey Amateur Radio Communications issued an open challenge back in January... Become an Amateur Radio 'Chameleon', expand your colors and step out of your comfort zone, try something new!

For amateur radio operators looking to expand their horizons, working low Earth orbit (LEO) satellites—or "birds" as they're affectionately known—offers a thrilling way to make long-distance contacts using technology that literally orbits the Earth. While the concept might sound complex, getting started with FM satellites is surprisingly accessible. In fact, with equipment you might already own, you can be making your first satellite contacts in no time.

Why FM Satellites Are Perfect for Beginners

FM satellites are widely considered the easiest entry point into satellite operations. Think of them as cross-band repeaters in space. Unlike their more complex linear counterparts (which operate like HF bands with multiple simultaneous users), FM satellites use a single uplink channel and a single downlink channel. This simplicity

means you don't need specialized equipment—a standard dual-band handheld transceiver (HT) and a basic antenna can get you on the air.

The concept is straightforward: you transmit to the satellite on one band (typically 70cm), and it retransmits your signal back to Earth on another band (typically 2m). This cross-band operation allows you to hear yourself through the satellite, which is invaluable for knowing your signal is getting through.

The Best FM Satellites for Beginners

While several FM satellites orbit Earth, not all are equally beginner friendly. Here are the current top choices for newcomers, based on recent operator reports:

SO-50 (Saudi-OSCAR 50)

SO-50 is the longest-operating FM satellite and remains a popular choice, though it requires a few extra steps. To activate the satellite, you must first transmit a tone of 74.4 Hz for a few seconds to wake it up. Once activated, the repeater uses a 67.0 Hz CTCSS tone for normal operation. While it works reliably, operators report it can be noisy and crowded, especially on weekends.

It's an excellent satellite for listening first to understand how FM satellite contacts work.

AO-91 (Fox-1A)

AO-91 has long been a favorite for beginners due to its strong signal and straightforward operation. It uses a 67.0 Hz CTCSS tone and operates in "mode U/V"—uplink on 70cm and downlink on 2m. However, operators should be aware that AO-91 only functions when it is in sunlight, and recent reports suggest it may be deteriorating and sometimes completely silent. Check status reports before planning your operating session.

SO-124 (HADES-R)

This satellite, designated Spain-OSCAR 124, was activated in early 2025 and carries both FM and digital repeater payloads. Early reports confirm its FM repeater works well. With uplink on 145.925 MHz and downlink on 436.885 MHz, it offers a fresh option for beginners who want to try a satellite with reliable modern hardware.

International Space Station (ISS)

The ISS isn't a dedicated amateur satellite, but it carries an FM repeater that is frequently available. The station's predictable passes and strong signals make it another excellent beginner option. The ARISS (Amateur Radio on the International Space Station) program maintains the amateur radio equipment on board. Check out a [SARC video](#) on working the ISS and other LEO amateur radio satellites.

The Tevel Satellites: A Generation of FM Birds

The Tevel series represents one of the most exciting developments in amateur radio satellites in recent years. These Israeli-built CubeSats are specifically designed with beginner-friendly FM transponders, and the program has recently expanded with a second generation. If you're just starting with satellite operations, the Tevel satellites deserve a spot on your list.

Tevel Generation 1 (Original Mission)

The original Tevel satellites (Tevel 1 through 8) re-entered Earth's atmosphere and are no longer operational. Re-entry dates ranged from July to August 2024. The original Tevel mission 1U CubeSats launched on January 13, 2022, aboard a SpaceX Falcon-9 Transporter-3 mission. These satellites were developed and built by high school students at the Herzliya Science Center's Space Laboratory in Israel, making it an educational mission as much as a technical one.

Key Details for Operators :

- Uplink: 145.970 MHz FM
- Downlink: 436.400 MHz FM
- Beacon: 436.400 MHz (9,600 bps BPSK G3RUH)
- Mode: V/U FM transponder

All eight satellites shared identical frequencies. When their orbital footprints overlapped, only one FM transponder at a time was activated to prevent interference. While they've completed their mission, their legacy continues with the second generation.

Tevel Generation 2 (Tevel2-X)

Building on the success of the original mission, the Tevel2 constellation launched on March 15, 2025, aboard SpaceX's Transporter-13 mission. This new fleet consists of nine 1U CubeSats (Tevel2-1



The Tevel-2 series ready for launch

through Tevel2-9), developed by Tel Aviv University's New Space Center in collaboration with nine Israeli municipalities and funded by the Israel Space Agency. These satellites were built by high school students—proof that satellite operation doesn't require a PhD. The amateur radio community is encouraged to participate by using the FM transponder and receiving telemetry.

Key Details for Operators :

- Parameter Value
- Uplink 145.970 MHz FM
- Downlink 436.400 MHz FM
- Beacon 436.400 MHz (9,600 bps BPSK G3RUH)
- Mode V/U FM transponder
- CTCSS Tone None required
- Orbit ~520 km, ~97.4° inclination (Sun-synchronous)

Like their predecessors, all nine satellites share the same frequencies. Only one transponder is activated at a time when footprints overlap to avoid interference.

Why Tevel2 Is Great for Beginners

The Tevel satellites use the same UHF-downlink/VHF-uplink configuration as other beginner-friendly FM satellites like AO-91. No special CTCSS tones are required.

The FM transponders have been activated and operators have successfully made contacts. For example, PU4ELT reported QSOs via Tevel2-3 with PT2VM and PY1SAN using 5 watts and a handheld Yagi. Transponders are activated periodically, so checking current status before operating is recommended.

What You Need to Work Tevel2

The equipment requirements are identical to any other FM satellite :

- Radio: Dual-band FM transceiver (2m/70cm)—a handheld works fine
- Antenna: Directional antenna like a handheld Yagi (Arrow or home-built)
- Tracking: Mobile apps like Heavens-Above, GoSatWatch, or W1ANT Satellite Tracker

- Doppler: Remember to adjust frequencies as the satellite passes—focus on the 70cm side

A Note About Access

These satellites are for amateur radio. A valid amateur radio license is required to transmit through them. If you don't yet have a license, you're welcome to listen—the downlink on 436.400 MHz is open to anyone with a receiver. As one operator noted, unauthorized transmissions disrupt communications that licensed amateurs have been waiting hours or days to make.

Check AMSAT status pages for current activation schedules, track the next pass over your location, point your Yagi skyward, and give the Tevel birds a call.

FM Satellites to Approach with Caution

Not all FM satellites are ideal for beginners. AO-92, while similar to AO-91, can be challenging. More importantly, AO-85 and several older satellites operate intermittently or have degraded performance. Before planning to use any satellite, check current operational status through AMSAT or other amateur satellite tracking resources.

What You'll Need to Get Started

The equipment requirements for FM satellites are refreshingly modest:

Your Radio

A dual-band (2m/70cm) handheld transceiver is sufficient to get started. For the best experience, full-duplex capability is highly desirable—meaning you can hear the downlink while simultaneously transmitting on the uplink. If your radio doesn't support full-duplex, using two separate handhelds (one for transmit, one for receive) works perfectly.

Your Antenna

There is nothing between you and the satellite once it rises above the horizon, it is line-of-sight so low-power is sufficient. A directional antenna improves success but is not a must-have. Many satellites can be worked with a decent handheld and rubber duckie antenna. Many build or buy a handheld dual-band Yagi or log-periodic antenna. The Arrow II antenna is a popular commercial option, and home-building a Yagi is also possible for the DIY-inclined. While some operators have

made contacts using rubber duck antennas with satellites, a directional antenna dramatically improves your success rate.

Tracking Tools

Satellites move quickly across the sky, with usable pass durations of ten minutes or less. You'll need software or apps to know when and where to point your antenna. Popular options include:

- iPhone: GoSatWatch
- Android: Heavens Above, Satsat
- Computer: There are various paid options for Mac, Linux and Windows but [SkyRoof](#) for Windows is free and amazing. It works even better with an inexpensive SRTL-SDR dongle for receive, so you can use even a single band radio for transmit.

These tools show you the satellite's azimuth (compass direction) and elevation (angle above the horizon), plus the times for acquisition of signal (AOS) and loss of signal (LOS).

The Full-Duplex Advantage

If you can hear yourself through the satellite while transmitting, you'll know instantly whether your signal is getting through and whether you're properly tracking Doppler shift. This immediate feedback makes full-duplex operation significantly easier, especially for beginners.

Understanding Doppler Shift

One of the unique challenges of satellite operation is Doppler shift—the apparent change in frequency caused by the satellite's high speed relative to your location. A satellite in low Earth orbit travels at approximately 17,500 miles per hour, and this motion distorts frequencies.

Fortunately, FM is relatively forgiving, and there's an easy rule to remember: Only adjust the 70cm frequency (whether it's your uplink or downlink), and remember that uplinks move up, downlinks move down.

When the satellite is approaching, transmit on a slightly lower frequency (for uplink) and listen on a slightly higher frequency (for downlink). As the satellite passes overhead and begins receding, the opposite adjustment is needed. In practice, many operators program their radios with several

channels at different frequency offsets and switch between them during the pass.

Making Your First Contact

Once you've tracked a satellite, set up your equipment, and managed Doppler shift, you're ready to make contact. Satellite QSOs (contacts) are typically brief—often just exchanging callsigns and grid squares. A typical call might be: "CQ satellite, [your callsign]".

Be patient. FM satellites can be busy, especially on weekends, and the "capture effect" means the strongest signal will dominate the repeater. Listen first to understand the rhythm and etiquette of satellite operations, then jump in when there's a pause. Clint K6LCS's page at: <https://www.work-sat.com/ewExternalFiles/FM-VOICE-SATS-2026a.pdf> will offer you additional insight and [N2YO's site](#) for pass predictions.

Expanding Your Satellite Horizons

Once you've mastered FM satellites, a world of additional opportunities awaits. Linear (SSB/CW) satellites allow multiple simultaneous contacts and offer more of an HF-like experience. Digital satellites transmit data modes like APRS. And for the truly ambitious, geostationary satellites like QO-100 provide constant, always-available access—though they require more substantial ground station equipment.

Final Thoughts

Working FM satellites represents one of amateur radio's most accessible and exciting frontiers. With modest equipment, a bit of preparation, and the willingness to learn, you can be making contacts through orbiting spacecraft from your backyard, a park, or anywhere with a clear view of the sky. The satellite community is famously welcoming to newcomers, and the thrill of hearing your signal bounce off a satellite hundreds of miles above Earth never gets old.

For further learning, AMSAT's Getting Started with Amateur Satellites is an excellent resource that covers everything from basic concepts to advanced techniques. Now grab your radio, point your antenna skyward, and start working the birds!

~ John VE7TI



Subterranean engineering,
analog communications, and
no signal security

The Baker Street "Walkie-Talkie" Heist

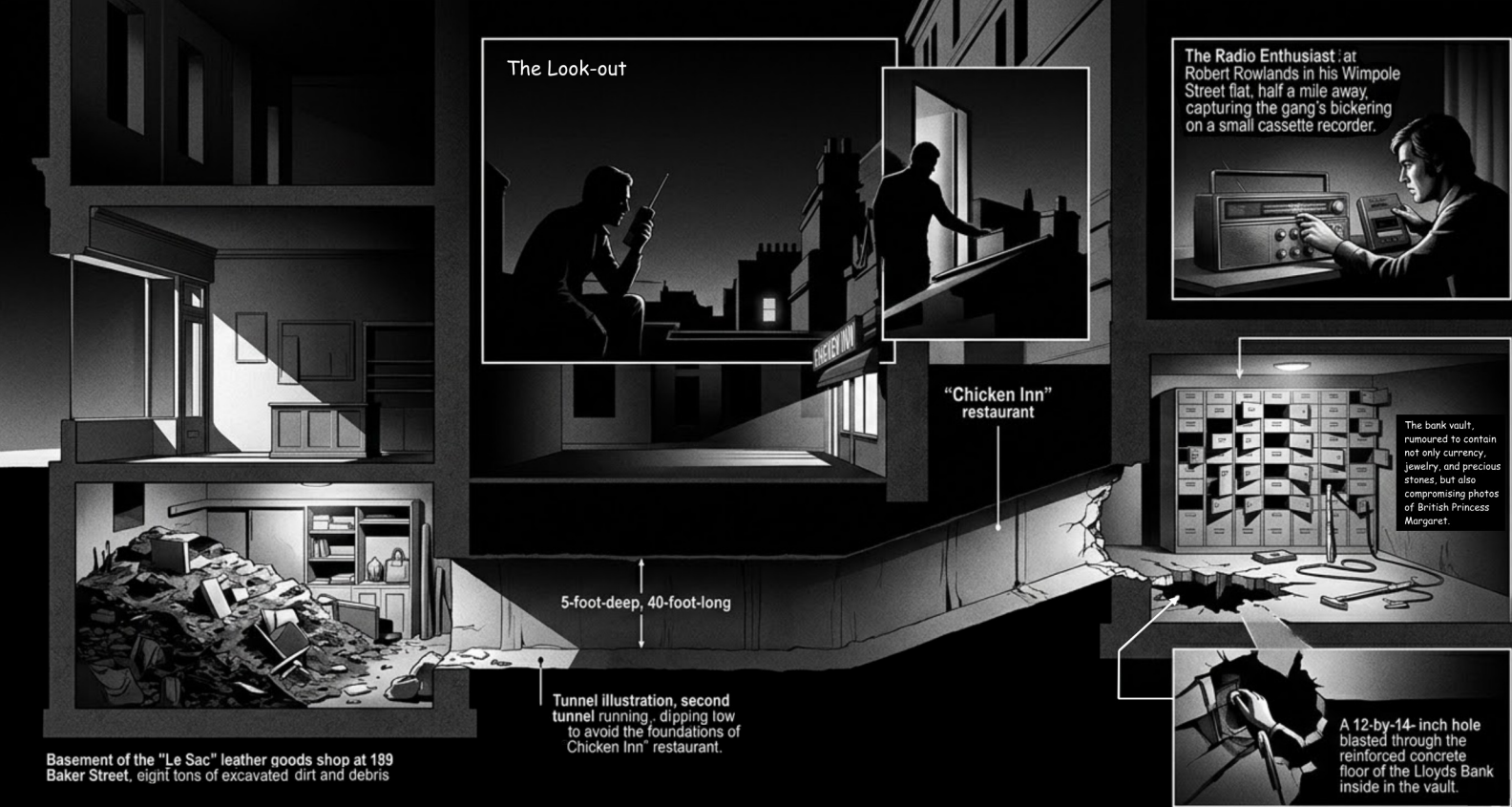
by JOHN SCHOUTEN VE7TI

In late summer 1971, London stood at a transitional moment—caught between post war restraint and the more volatile decade that would follow. On Baker Street, a location long associated with analytical problem solving through its literary connection to Sherlock Holmes, a group of criminals undertook one of the most technically unusual bank robberies in British history. The operation would later become known as the “Walkie Talkie Robbery,” a name that reflected not the method of entry or the scale of the theft, but the unsecured radio communications that ultimately exposed it.

Public interest in the case resurfaced in 2025 following redevelopment of the former Lloyds Bank site at 185 Baker Street into the luxury “Berkeley Court Quarter.” The renewed attention has highlighted the robbery’s unusual combination of traditional tunneling techniques, mid 20th century radio technology, and institutional blind spots in law enforcement response.

The plan

The operation was led by Anthony “Tony” Gavin, a 38 year old former soldier whose military background influenced both the planning discipline and the division of labor within the group. Gavin reportedly based the core concept on Arthur Conan Doyle’s *The Red Headed League*, a Sherlock Holmes story in which criminals access a bank vault by tunneling from a nearby business. The fictional premise was translated into a real world plan with minimal modification.



To establish a staging area, gang member Benjamin Wolfe leased a leather goods shop called Le Sac at 189 Baker Street, two doors from the target Lloyds Bank branch, and tunnelled during weekends. The shop was already in decline, making deliveries of crates and intermittent construction noise unremarkable. A critical operational error occurred at this early stage: Wolfe signed the lease in his own name, creating a traceable paper trail that would later contribute to the group's arrest.

Gavin asked Reg Tucker, a second-hand car salesman who had no criminal record, to reconnoitre the bank. Tucker opened an account with £500 in December 1970 and two months later he rented a safety deposit box in the branch; over the next few months he visited his box thirteen times. Bank practice of the time was for staff to leave customers in private while visiting the vault. As soon as Tucker was alone, he would measure the room using the span of his arms and an umbrella he brought with him; he was aided in getting exact measurements by the regularly sized floor tiles, each of which was nine inches (23 cm) square. He drew a map of the room, plotting where the cabinets were and the position of the furniture.

Thomas Stephens, another second-hand car salesman with no criminal record, was used to acquire the tools needed for the break-in, including a thermal lance and a 100-ton jack; one of Reader's friends, Bobby Mills, was employed to be the lookout man. Two others were brought in for the job, one of whom was an explosives expert. Another of Gavin's friends, Mickey "Skinny" Gervaise, a burglar-alarm expert, was brought on board, as were two men who have never been identified: "Little Legs" and "TH". Lashmar reports that TH was a contact of Detective Inspector Alec Eist, whom he describes as "by reputation the most corrupt Yard officer of the 1950s to mid-1970s". Journalist Duncan Campbell describes Eist as "One of the most active bent officers from the 1950s to the 1970s".

Tunnel construction and structural challenges

Excavation began in August 1971 and continued over three weekends to reduce detection risk. The tunnel extended approximately 40 feet and passed beneath the "Chicken Inn" restaurant, requiring excavation to a depth of roughly five feet below street level. The diggers worked through layers of historical foundations, navigating water pipes and gas mains without formal schematics, ventilation, or structural reinforcement.

By September 10, the group had removed an estimated eight tons of material, storing the spoil inside the Le Sac premises. The final barrier—the reinforced concrete vault floor—presented the greatest challenge.

The gang began their entry into the vault on Friday 10 September, after the bank closed for the weekend. The gang placed a lookout man on a rooftop overlooking the bank, and kept in contact by using walkie-talkies. Their intention was to use the 100-ton jack to force a hole in the 3-foot-thick (0.91 m) reinforced concrete floor, and railway sleepers were laid on the floor to support it. What they did not know was that there was an old well under where the tunnel ended, and the pressure of the jack pushed the bottom of their tunnel down into the well, rather than raising the vault's floor upwards.

Hydraulic jacks require a rigid opposing surface to function effectively. In this case, the tunnel floor consisted of loose earth rather than reinforced footing. As force was applied, the jack displaced downward into the soil instead of transferring stress into the vault slab above.

This illustrates a common engineering principle: force without structural resistance produces movement, not fracture.

The team then employed a thermal lance. A thermal lance is a high temperature cutting tool that operates by feeding oxygen through a steel tube packed with iron rods. Once ignited, the lance burns at temperatures exceeding 3,000°C, hot enough to melt steel, concrete, and reinforced materials. Unlike mechanical drills or saws, a thermal lance does not rely on torque or cutting edges. Instead, it oxidizes material through extreme heat. This makes it effective against reinforced vault floors but also produces intense smoke, molten slag, and toxic fumes—particularly dangerous in confined, unventilated spaces such as underground tunnels.

In the Baker Street robbery, the lance proved partially effective but physically debilitating for the operators, contributing to exhaustion, poor visibility, and rising tensions within the team. When this failed they drilled holes in the underside of the vault floor and packed them with gelignite. On Saturday the gang co-ordinated the blast of the explosives with the movement of traffic in the area to mask the

Walkie Talkies in 1971 — Portable, but Insecure

By the early 1970s, handheld two way radios had become compact, affordable, and widely available. They offered real time coordination without fixed infrastructure, making them attractive for construction crews—and criminals.

However, most consumer and semi professional radios operated on open frequencies with no encryption, no authentication, and limited channel control. Any receiver tuned to the correct band could listen in.

In the Baker Street case, the robbers' communications were clear, continuous, and unprotected—effectively broadcasting operational updates to anyone scanning nearby frequencies.

noise. A 12-inch-wide (30 cm) hole was blasted through the floor and into the vault. The tunnel was cleared of the debris created, and the hole was widened with a hammer and chisel. By the time they had finished, the exit of the tunnel measured 12 by 14 inches (30 by 36 cm).

Communications gone awry

Coordination between the tunnel team and an external lookout relied on handheld two way radios operating on unsecured frequencies. Thick masonry and underground depth prevented reliable transmission to street level, necessitating a relay system involving a rooftop lookout, known to the group as “Bob.” This individual monitored police activity near the bank entrance and relayed warnings to the team below. The communications system functioned effectively from an operational standpoint but lacked any form of encryption or frequency management.

At around 11:00 pm on Saturday 11 September Robert Rowlands, an amateur radio enthusiast living in a flat in Wimpole Street, half a mile (800 m) away from the Lloyds branch, picked up the walkie-talkie conversations of the gang. He heard comments over the radio that made him think a local cigarette shop was being burgled. Initially attempting to contact a friend overseas

Robbery—Despite Being On Site

Traditional bank security doctrine in 1971 focused on forced entry through doors, windows, and vault locks. Officers inspecting the Baker Street branch found the time locked vault door intact and no visible damage, leading them to conclude the premises were secure.

The concept of vertical intrusion—access through floors rather than doors—fell outside standard inspection protocols. As a result, police stood within feet of an active crime without recognizing it.

The incident exposed a critical blind spot in physical security assumptions: that access vectors are horizontal and visible.

or tune into Radio Luxembourg, Rowlands instead encountered an unintentional live broadcast of the crime.

Robert Rowlands's interception was not the result of advanced surveillance or law enforcement monitoring, but of routine hobbyist activity. The clarity of the intercepted signal suggests that the robbers were transmitting at sufficient power to overcome underground attenuation—at the cost of signal discretion.

The incident remains one of the earliest real world examples of unintentional signal leakage exposing covert activity.

Accidental interception and evidence capture

Rowlands contacted Marylebone police at 11:30 pm. The local police officer thought it was a prank call, and told Rowlands that he should record the conversation if anything interesting was overheard. Rowlands thought it was a good idea, so used a small cassette recorder to make a record of the conversations. At around midnight he recorded dialogue between the gang inside the shop and the nearby lookout about their need to take a break:

First voice: *Right, well listen carefully. We want you to mind for one hour from now until approximately one o'clock and then to go off the*

air, get some sleep and come on the air with both radios at six o'clock in the morning.

Second voice: *I suggest we carry on tonight, mate, and get it done with.*

First voice: *Look, the place is filled with fumes where we was cutting. And if the Security come in and smell the fumes we are all going to take stoppo and none of us have got nothing. Whereas this way we have all got 300 grand to cut up when we come back in the morning. And if Security have naused it for us, well at least we have got something.*

The disagreement between the lookout and gang continued for a while, and one exchange revealed tensions between the exposed rooftop lookout and the men below, culminating in the now famous statement: *"Money may be your god, but it's not mine, and I'm f@#king off!"* Eventually, after input from a woman's voice and a fourth person who seemed to carry more sway than the others, the lookout agreed to remain on the roof overnight. The lookout man was also given an update on the progress they had made in opening the safety deposit boxes: *"We have done 90 per cent of the easy ones and we now face the hard ones."*

These recordings would later become a unique piece of forensic evidence, capturing operational updates, internal disputes, and the physical toll of prolonged underground work.

Law enforcement response and failure

At 2:00 am Rowlands decided he had enough material recorded to call the police again; he did not recontact his local station, but phoned Scotland Yard directly. Scotland Yard sent members of the Flying Squad to listen to the tapes, and they confirmed that they thought a burglary was taking place. The officers stayed with Rowlands until 8:30 am on Sunday 12 September when the gang returned to the shop and radioed the lookout.

One of the gang members in the shop thanked him for staying on the roof all night and informed him that they planned to finish the job early that afternoon. At one stage in the morning a waiter from the Chicken Inn restaurant heard noises from within the bank and peered through the windows of the building to see if anything

could be seen. Shortly afterwards Rowlands and listening policemen heard the final radio transmission *"Would you like to change to the other channel, over"*. Rowlands thinks this was the code for leaving the bank.

Police contacted bank staff and local security firms to open up their branches as they began to check 750 banks in an 8-mile (13 km) radius. Each branch was visited by both bank staff and police. They visited the Baker Street branch of Lloyds at 3:30 pm on 12 September. They found the vault secure; they were unable to open the vault to check as it was time locked. Beneath the vault floor, the robbery continued uninterrupted, but keeping quiet following a warning from the lookout.

Discovery and arrests

The breach was discovered Monday morning when bank staff entered the vault and found the floor destroyed and 268 of 400 safety deposit boxes emptied. Tools, radio equipment, and a message referencing Sherlock Holmes were left behind. The estimated haul ranged from £1.25 million to £3 million—over £54 million in contemporary value.

Media coverage ceased abruptly four days later, reportedly due to a government D Notice. This fueled speculation that certain deposit boxes contained politically sensitive material, including alleged compromising photographs linked to Princess Margaret—claims later dramatized in the 2008 film *The Bank Job*.

Ultimately, the case unraveled due to the lease signed by Wolfe. Surveillance led to arrests in October 1971. Gavin, Reg Tucker, and Thomas Stephens received 12 year sentences; Wolfe received eight.

As the site undergoes redevelopment more than five decades later, the incident stands as a reminder that even sophisticated defenses are vulnerable—not necessarily to advanced tools, but to overlooked signals already moving through the air.

Modern Lessons

The Baker Street robbery demonstrates how complex systems fail not at their strongest points, but at their assumptions. The bank relied on vault integrity. The police relied on visible entry points. The criminals relied on unencrypted radio.

Each component worked as designed—yet the system as a whole failed.

Modern security engineering formalizes this lesson under the concept of attack surface expansion: threats emerge wherever a system is not explicitly designed to look.

And our intrepid amateur radio operator? After the end of the investigation Scotland Yard considered prosecuting Rowlands under the Wireless Telegraphy Act 1967 for listening to unlicensed transmissions, but no charges were laid against him. The good news... shortly after the court case, Lloyds Bank sent him a cheque for £2,500 to thank him for his actions.

~ John VE7TI

Compiled from a variety of sources

Here is the link to the latest April 2026 issue of Ham Radio Ireland Magazine, A free publication downloadable from the following link in PDF Format PDF Version.

<https://www.docdroid.com/gOqHn7i/hrivol03042026-pdf>

Click on the graphic to go to the Flip book version



Lizard Wireless Station



In 1900 the Italian inventor Guglielmo Marconi undertook ground-breaking wireless experiments on The Lizard. With determination and vision, he developed technology on these remote Cornish clifftops that paved the way for today's instant worldwide communication.

In [January 1901](#), working from simple wooden huts, Guglielmo Marconi received a transmission from the Isle of Wight over 180 miles away. This experiment proved that radio waves could travel beyond the horizon—something many scientists at the time believed was impossible. With two radio stations just six miles apart—one at Lizard Wireless Station and the other near Poldhu—Marconi had an ideal setup to refine tuning and reduce interference.

Marconi quickly recognized the commercial potential of radio. The Lizard Wireless Station became one of a dozen coastal stations in the [UK](#) handling ship-to-shore messages for a fee. In 1910, it made history as the first coastal radio station to receive an SOS call when the Minnehaha ran aground off the Isles of Scilly and radioed for help.

On [April 22, 2026](#), amateur radio enthusiasts gathered to mark the 150th anniversary of Marconi's birth. A commemorative event was held at the Marconi Museum on the Lizard Peninsula, where much of his pioneering work took place. In 1901, Marconi also achieved a major milestone here: the first transatlantic radio communication, sent from Poldhu to Newfoundland, Canada. During the anniversary event, Poldhu Amateur Radio Station was active, making contacts around the world.

Known as the "Father of Radio," Marconi was awarded the Nobel Prize in Physics in 1909 for his groundbreaking contributions to wireless communication.

Today, the radio station has been restored to reflect its appearance during Marconi's era, and visitors of all ages can explore and interact with the technology inside. One of the original huts, overlooking Housel Bay, has been converted into a National Trust holiday cottage.

The Marconi Centre at Poldhu—famous for the first transatlantic radio signal—is now operated by the [Poldhu Amateur Radio Club](#).





British Columbia QSO Party 2026

The results are in

by REBECCA KIMOTO VA7BEC

Rebecca Kimoto VA7BEC is the Secretary and contest coordinator for the British Columbia QSO Party, held on the first full weekend of February each year.

Visit ORCA at: <https://www.orchadxcc.org/index.html>

Results—for BC and outside BC—and the after-party report with number-crunching analysis have been posted to the BCQP pages of the Orca DXCC website.

In “Initial Thoughts” (The Communicator, March-April 2026), written before the log deadline, my perspective on BCQP 2026 was that it had been well-attended despite challenging CONDX. The number of logs submitted at that point in time was lower than in 2025 but still commendably high and, indeed, the final log count settled at 386, down from an all-time high of 421 in 2025. That said, the ratio of certificates awarded to the number of logs received grew, indicating wider participation geographically and in classes of entry.

The certificate program recognizes top BC scores in category of entry by federal electoral district and top scores outside BC in category of entry by province/state/DX entity. There are so many opportunities to pick up some lovely wallpaper for the shack or for the desktop.

Nearly half the stations submitting a BCQP log are rewarded for their efforts. In 2024, the award ratio was about 46.0%, with 171 out of 372 log-submitting stations capturing tangible recognition for results achieved (35 in-province, 136 outside BC). In 2025, the ratio dipped to 44.4%, largely because of the huge number of logs received, with 187 out of 421 log-submitting stations receiving a plaque and/or certificate (43 in-province, 144 outside BC). In 2026, the ratio rebounded to 47.7%, with 184 out of 386 log-submitting stations getting something nice to hang on the wall.

A geographical breakdown of the 386 logs submitted in 2026 shows 56 logs from stations in BC, 45 from stations in other parts of Canada, 279 from U.S. stations, and six from stations outside North America, notably, Japan but interestingly, Slovakia and Uruguay.

BC results: https://orchadxcc.org/content/pdf/bcqp/2026_line_scores_BC.pdf

Outside BC results: https://orchadxcc.org/content/pdf/bcqp/2026_line_scores_outsideBC.pdf

After-party report: https://orchadxcc.org/content/pdf/bcqp/2026_BCQP_report.pdf

A close look at submitted logs shows that 133 BC stations were on the air in 2026, but logs were received from fewer than half of these stations. Were the operators only part-time participants, giving points to pals, and didn't keep a log? Did they jot down a few details, like callsign and "59," on a scrap of paper and then realize they didn't have all the necessary data for logging a contact? Did they lose the scrap of paper? Did they procrastinate too long about turning the scrap of paper into a Cabrillo file? Was the log too small—from the operator's perspective—to warrant the steps of submitting a log? Many possible reasons.

Another point of interest, at least from a participation standpoint, is that 26 VE7/VA7s in submitted logs were uniques. That is, they appeared in only one submitted log. Were they accidental participants, who were just tuning through the bands, heard a station calling CQ BCQP and answered? Or casual participants who only had a couple of hours that unfortunately coincided with horrible CONDX, leading to one measly Q and not worth submitting a log for? Or a busted callsign of someone who didn't send in a log and thus doesn't show up reciprocally as a NIL (not in log) in the submitted log report? Again, many possible reasons, and no definitive answers.

I would say, from an organizer's perspective, no log is too small. A log of even one QSO will confirm that contact in a reciprocal log as well as the federal electoral district used in the exchange, boosting the accuracy of log-checking. This is important because, in many cases, an accidental BC participant may be the only active station in a particular federal electoral district or on just one mode. Anyone embarrassed by a low score should simply submit a checklog, which is used exactly as the name implies—as a log for checking (confirmation) purposes.

If submitting a log is just too much of a hassle, then I really encourage casual or accidental participants to make at least two or three contacts

so that the callsign doesn't appear as a unique in terms of log-checking and contest administration.

BCQP is a two-day event—12 hours on Saturday and eight hours on Sunday. Both days tend to see quite a high level of activity. CW tends to be the popular mode overall. See the graphs in the number-crunching section of the post-party report for more details.

The [report](#) always includes a behind-the-scenes section—a deep-dive into BCQP based on my perspective as contest manager and operator at sponsor station VA7ODX. While comments gleaned from 3830 and chats with regular participants as well as what transpired at VA7ODX, I get a pretty good idea of how each running of BCQP plays out. But I decided to go beyond these sources of input for this year's Behind the Scenes and asked a diverse group of participants—Ys, OMs, in-province, outside-BC, repeat participants and first-timers, experienced testers and not-so-experienced operators, single-mode and two-mode operators, single-op and multi-op—to give me their thoughts. The Q&A starts on page 3 of the report.

BCQP is a fun event. I realize that QTH, equipment including antenna type, and level of contesting experience can influence the degree of fun. But stations near and far are actively searching for VE7/VA7s in BCQP. We VE7/VA7s are in demand. And we're in the spotlight. Antennas are actually pointed in our direction! How often does this happen? Let's make the most of this wonderful opportunity to hone skills and help newcomers to the hobby become comfortable calling "CQ".

Let's party again in 2027. It's always a whale of a good time.

73,

~ Rebecca VA7BEC,
Contest Manager, BCQP

Phoenix HF RF Amplifier

Rebuilding and Modernizing the Icom IC-PW1

by DON WESTACOTT VE6HQ

Amateur radio is an experimental science. As enthusiasts, we conduct radio frequency communications experiments, develop new technology and construct electronic equipment and radio antenna systems. In addition, we often troubleshoot and repair the electronic equipment we use in our radio operations.

This article describes troubleshooting, repair and upgrades to an Icom IC PW1 RF amplifier. Without going into specific details, I was asked if I could repair two separate PW1 amplifiers owned by two amateurs here in Alberta.

The IC-PW1 is a solid-state RF amplifier that was first manufactured by Icom in 1999. The IC-PW1 was one of the first commercially available solid-state 1 kW HF amplifiers and quickly became popular among contest and DX operators. This product was discontinued by Icom and thus replacement components, especially circuit boards, are difficult to impossible to obtain.

The Icom IC-PW1 had many innovative features including:

- One (1) kilowatt nominal output power
- Operation for ten (10) amateur bands, 160 m through 6 m
- Built in automatic antenna tuner

- Switchable input (2) and output (4) RF connections
- Firmware monitoring of all important operating parameters
- Remote control head connected by cable
- CI-V control available

Both amplifiers suffered from multiple failures including a defective power supply, control circuitry issues, and damaged interface electronics. It was reasonable and time effective during the troubleshooting process to simply replace defective components in one amplifier with parts obtained from the other. The IC-PW1 has many well documented failure points within its overall system architecture and internet information searches greatly assisted in the diagnosis of the multiple electronic failures that had occurred on both amplifiers. In a fairly short time frame, a working amplifier was returned to its owner in Edmonton. Unfortunately, the second amplifier was essentially gutted with nonfunctional power supply, control head and main control board. I realized that replacement and repair to original factory condition was problematic. It was decided a practical path forward was to rebuild and modernize the amplifier while removing a significant



■ General

• Frequency coverage:

1.800–1.999 MHz
3.500–3.999 MHz
7.000–7.300 MHz
10.100–10.150 MHz
14.000–14.350 MHz
18.068–18.168 MHz
21.000–21.450 MHz
24.890–24.990 MHz*¹
28.000–29.700 MHz*¹
50.000–54.000 MHz

*¹The USA version can only be used the antenna tuner on the 24–28 MHz bands.

• Antenna connector:

Input PL-239 × 2 (50Ω)
Output PL-239 × 4 (50Ω)

• Usable temperature range:

–10°C ~ +40°C (14°F ~ 104°F)
(Except Antenna tuner)
0°C ~ 40°C (32°F ~ 104°F)
(Only Antenna tuner)

• Power supply requirement:

non-Europe versions
100–120 V AC or
200–240 V AC (±10 %)

Europe version
230 V AC (±10 %)

• Dimensions (W × H × D):

Liner amplifier
350 × 265 × 375 mm
13.8 × 10.4 × 14.8 in
Remote controller
205 × 71 × 68.3 mm
8.1 × 2.8 × 2.7 in
(Projections are not included)

• Weight (approximate):

28 kg (61.7 lb)
(Remote controller is included)

• CI-V connector: 2-conductor 3.5 (d) mm (1/8")

■ Transmitter

• Output power:

MODE	INPUT AC VOLTAGE	
	200–240 V AC	100–120 V AC
CW, RTTY	1 kW	500 W
SSB	1 kW PEP	500 W PEP

- Driving power: 100 W maximum
- Spurious emissions: –60 dB (HF bands)
–70 dB (50 MHz band)
- SEND connector: Phono (RCA)
- ALC connector: Phono (RCA)

■ Antenna tuner

• Matching impedance range:

HF bands*² 16.7 to 150 Ω unbalanced
(Less than VSWR 3:1)
50 MHz band 20 to 125 Ω unbalanced
(Less than VSWR 2.5:1)

*²The USA version can only be tuned within 1.80–1.95MHz of the 1.8 MHz band.

• Minimum operating input power:

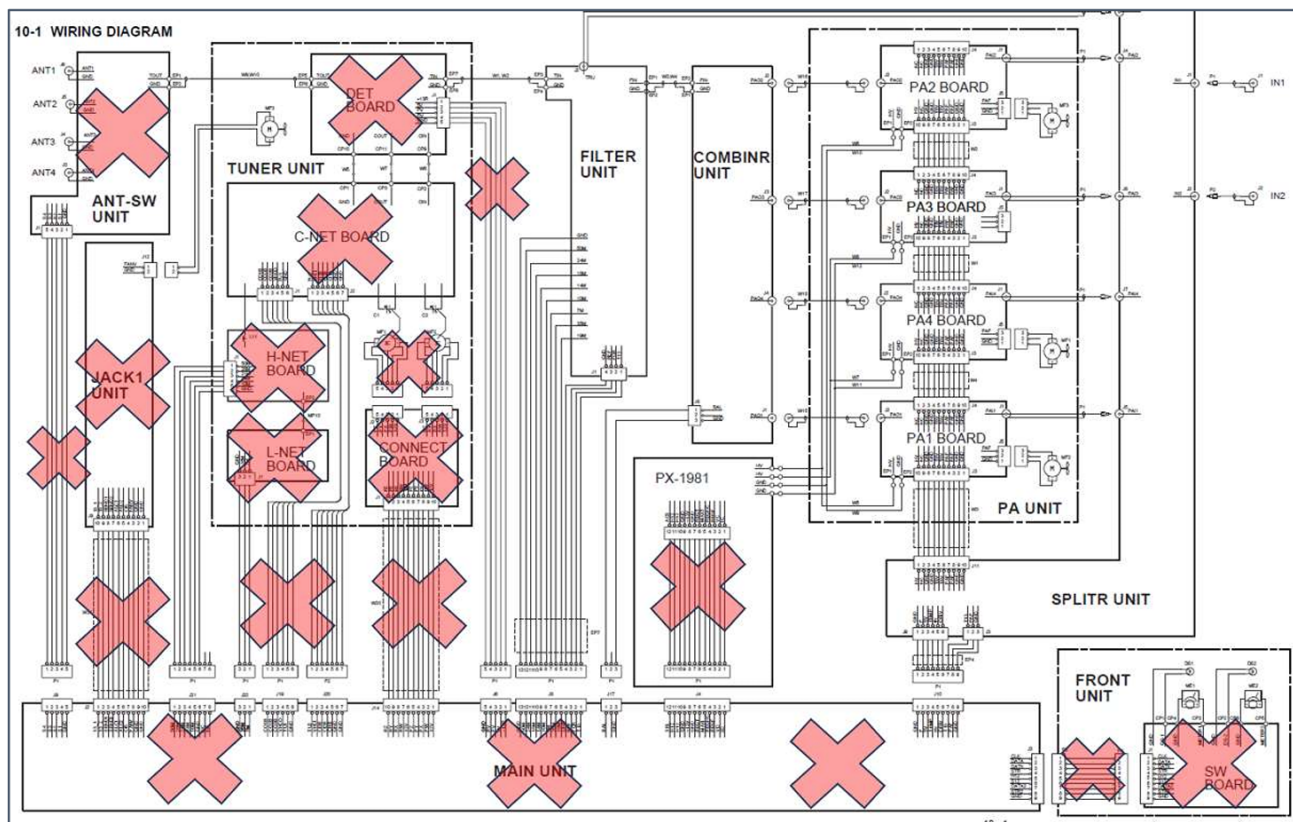
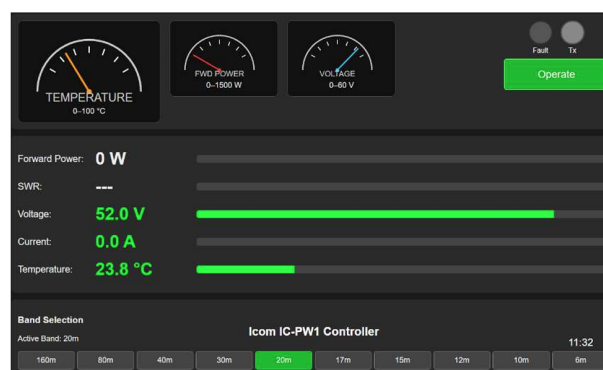
60 W

- Tuning accuracy: VSWR 1.5:1 or less
- Insertion loss: Less than 1.0 dB
(after tuning)

number of non-essential or defective components (marked with **Red X** below).

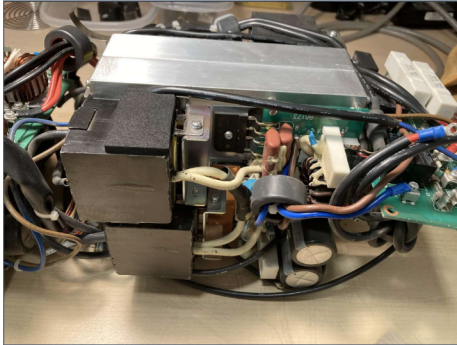
The rebuilt amplifier is shown below along with a web-based control interface that controls and monitors the amplifier using Ethernet LAN connection and remote Windows based computer.

The amplifier is controlled by an Arduino UNO R4 microcontroller, running C++ firmware and a JavaScript-based web interface. I had zero expertise in software programming and graphical user interface development prior to this project. Amateur radio provides an environment to learn and develop new skills that provided considerable enjoyment to me during this PW1 rebuild and update. To be clear, this was not an easy project and presented considerable technical challenges with the occasional frustration when “things” simply did not work. However, as I learned through many years working in the energy sector, *“it is best to focus on the solutions rather than dwell on the problems.”*



Power Supply

The IC-PW1 power supply is known to be problematic, and many articles are available that document both technical issues and solutions. The nonfunctional power supply was



removed from its case and is shown below.

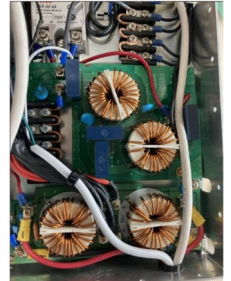
Several modular switching power supplies were available, and I proceeded to replace the defective power supply with this device. The Cordex CXRF-HP series of 48 Volt, 1.2kW, rectifier modules employ high frequency, switch mode technology featuring high power conversion efficiency. All internal semiconductor devices operate under “soft-switching” conditions and exhibit very low power loss. The reduced power loss leads to lower thermal stress on the semiconductors and thus improves reliability.

Four Cordex rectifier modules were installed in parallel within the PW1 power-supply chassis, providing 48 VDC at approximately 100 A (4.8 kW capacity). The PW1 RF deck operates from a high-current 48-volt DC supply, making telecom rectifier modules an excellent replacement option. A 48 Volt DC to 12 Volt DC converter module was also placed within the power supply chassis. This 12-volt source would be used to



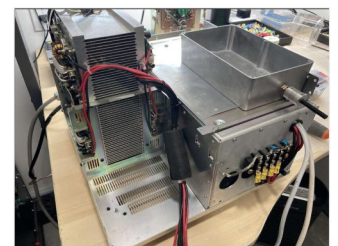
power the Arduino R4 micro processor and band switched low pass filters within the amplifier. The rebuilt power supply has significant capacity and overcomes many of the limitations of the original factory unit.

AC and DC filters obtained from the original PW1 power supply were reused within the rebuilt power supply. A solid-state relay is controlled by front panel on/off switch to energize / deenergize all power supplies. Thermal cooling is provided by front and rear fans.

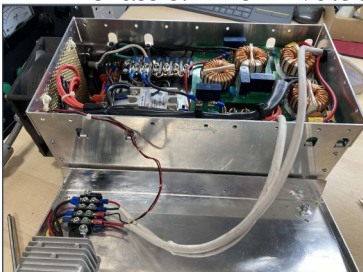


Power Supply Telecom rectifier modules such as the Cordex series are widely available on the surplus market, highly reliable, and designed for continuous high-current operation. Fan intake ports are shown for the rebuilt power supply (partially hidden by external wiring). It was somewhat coincidental that the four Cordex power modules were a “perfect fit” within the existing power chassis. Using this construction method the new power supply could simply be a direct “drop in” replacement within the overall PW1 amplifier.

The RF low pass filter is illustrated at the rear of the photograph. Eight (8) selectable filters are used for the 10 operating bands. A common filter is used for both 17 m / 15m and 12 m / 10 m bands.



The photograph on the right shown above illustrates an early “mock-up” assembly. An aluminum box placed on top of the power supply was to contain a rotary ten (10) position switch used to control the low pass filter selection. After some time and thought, I discarded this control procedure and started a much more ambitious plan to provide control of the amplifier.

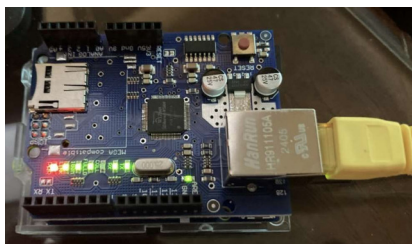


Microprocessor Control

Today, some form of CPU is present in almost all electronic devices, from the vehicles we drive, to the phones we use, to kitchen appliances that supply us with the essential coffee. Amateur radio is no exception, microprocessors are common in modern RF transceivers, amplifiers and many other hardware items that we use during our radio communications activities.

I had purchased an Arduino UNO R4 WIFI sometime in the past with the objective of learning how to use this type of device. Sadly, the microprocessor sat in my parts bin and was neglected due to other priorities that appeared.

Fortunately, I remembered that I had this device and wondered if I could use it to both control and monitor the PW1 that I was



rebuilding. This seemed reasonable especially with the sub \$50 price tag for the device, it appeared to be a low-risk endeavor. However, a microcontroller without software simply consumes power and performs no useful function. As previously indicated, I had zero expertise in writing software to control complex operations and monitor hardware functions. In addition, I wanted a modern graphical user interface (GUI) to which I had even less experience or knowledge how to create or code.

Software Solution

Significant technology changes have occurred since my beginning in amateur radio with construction of a crystal radio receiver and 6V6 vacuum tube transmitter. Today, as radio amateurs, we enjoy access to information and technology that is truly remarkable. One such technology is the AI platforms that are widely available through the internet.

I commenced a process to develop PW1 control software with the assistance of the AI program ChatGPT. Through software development the following specifications were identified:

Control of the amplifier either from front panel push buttons or a web-based GUI operating through a LAN on a remote windows computer.

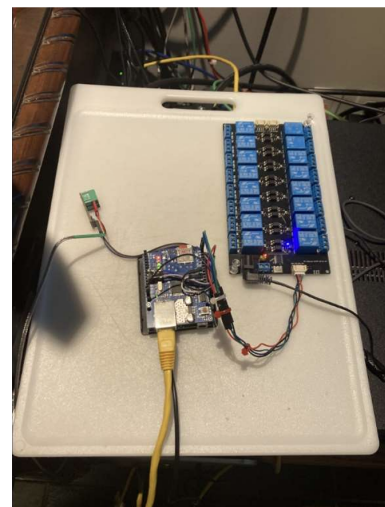
- Web-based GUI to provide band change functions for low pass filter selection.
- Realtime display of amplifier output power, VSWR, PA Voltage, PA Current and Temperature
- Monitoring of VSWR, Voltage, Current and Temperature and automatic amplifier shutdown if any parameter exceeds defined limits.
- Band hot switch protection to disable amplifier in case a band change is activated during transmission. (N.B. this was an earlier defect in the original PW1 design which resulted in amplifier damage for numerous operators.)

Software Solution

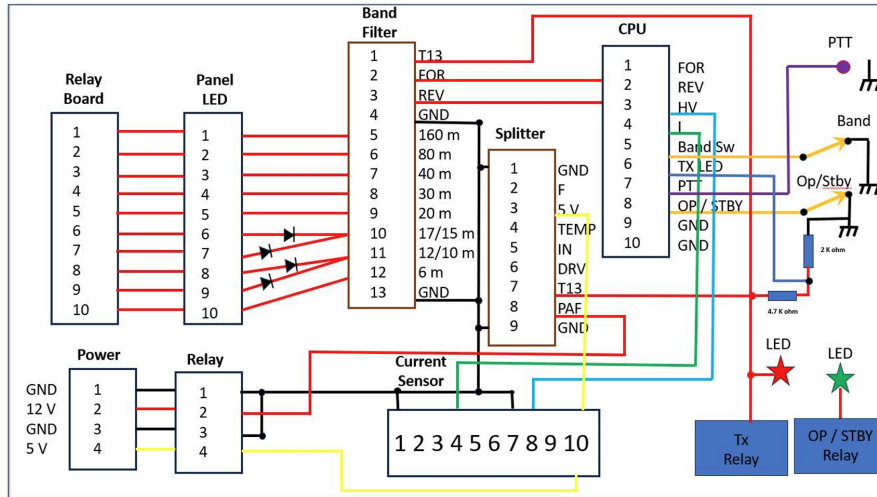
ChatGPT was used as an engineering assistant during development, helping generate code examples, debug problems, and suggest hardware interface approaches. However, it was an extended interactive and iterative process with some 30 to 40 versions of software being created and tested before the system worked adequately. My experience using ChatGPT may be described as dealing with two unique individuals, one a brilliant technical expert, the other a rebellious teenager that does not follow instructions.

Gradually, I learned to communicate effectively with the ChatGPT application, however the initial weeks Microsoft seemed to have the teenager working most of the time rather than the technical expert. I breadboarded the Arduino Uno R4, an Ethernet shield, a temperature sensor, and an I2C-controlled 16 port relay module during software testing. (Yes, that is a real breadboard borrowed from XYL!)

Through the hardware / software development a multitude of challenges occurred with the selected Uno R4 device. While they are too numerous to document in this article, I will state that ChatGPT was very helpful in solving these problems that first appeared unsolvable to me.



Hardware Interface



The interface board was mounted to the inner bottom of the case and provided all connections plus voltage and current sensors.

The amplifier may be controlled either by front panel push buttons or remotely from a computer via a wired Ethernet LAN connection. Amplifier PA voltage, PA current and temperature are displayed on the front panel. Power, standby / operate and band change buttons with corresponding band LED indication.

After achieving a workable software application, I created a circuit diagram to show the interface connections between the microprocessor i/o ports and the PW1 hardware. I was familiar with the original PW1 circuit diagrams through my extensive review of them while repairing the first PW1 amplifier.

Voltage, current, temperature, and RF power are monitored using a combination of analog sensors and existing PW1 measurement circuits interfaced to the Arduino controller. An objective of the PW1 rebuild was to simplify the overall design and enhance the robustness and reliability of the entire system. In addition, modifications to component layout enhanced the ability to troubleshoot, repair or modify the amplifier if required.

Hardware Assembly

The antenna tuner unit (ATU) and main board chassis were removed from the original PW1 components. An aluminum case was sourced and would be used to contain the Arduino Uno R4 microprocessor and related sensor and control circuitry. This case was selected to provide RF shielding between the high-power RF amplifier and the electronics section of the amplifier. The Uno R4 and relay board were mounted on the inner top lid of this case.

A Hall-effect sensor is used to measure final amplifier current and transfer data to the UNO R4 for monitoring and display. This sensor was a cost effective and practical method to measure



the high DC current values present during amplifier operation.

Appropriate grounding, shielding, and RF bypassing were implemented to ensure stable operation and to prevent RF interference with the control electronics.



Summary

The IC-PW1 rebuild was an extensive project with many technical challenges that required innovative solutions. This project provided significant technical learning as well as introduction to modern software development and programming skills. Like many projects undertaken by radio amateurs, I concluded upon completion of this project that I would likely design it differently if I were to repeat the process again. However, important technical factors were addressed during this RF amplifier construction that included:

- **RF Isolation**

Because the amplifier operates at high RF power levels, particular attention was given to RF isolation between the control electronics and the RF amplifier section. The Arduino controller and interface circuitry were installed in a separate aluminum enclosure which provides effective RF shielding. Feedthrough wiring between the RF deck and control electronics was carefully routed and bypassed to prevent RF coupling into the control system.

- **Protection and Fault Handling**

The control software continuously monitors operating parameters including PA voltage, PA current, temperature, and VSWR.



RF Deck
|
Low Pass Filters
|
Arduino UNO R4
| Ethernet Interface
| Relay Control (PCA95x5)
| Temperature Sensor
| Voltage Monitor
| Current Hall Sensor

If any parameter exceeds predefined limits, the amplifier is immediately switched to standby, and the fault condition is reported on the web-based GUI. This provides an additional layer of protection beyond the original PW1 hardware protection circuitry.

- **Control Architecture**

The Arduino UNO R4 functions as the central control processor for the amplifier. Digital outputs control the band switching relays for the low pass filters, while analog inputs monitor amplifier voltage, current, and temperature sensors. Ethernet connectivity allows a remote computer to access a web-based graphical interface for monitoring and control.

I consider this project successful in restoring a non-functional amplifier back from the ashes to an enhanced and fully functional RF HF high power amplifier. The rebuilt amplifier demonstrates how modern microcontrollers and software tools can extend the useful life of legacy RF equipment while adding new monitoring and control capabilities.

All modifications were performed for experimental and educational purposes by a licensed advanced class amateur radio operator.

~ Don VE6HQ

About the Author

Don has pursued a lifelong interest in science and engineering beginning as a youth in western Canada. He received his first amateur radio license at the age of 15 while attending high school in Edmonton, Alberta, Canada.

Don continued this interest and graduated from the University of Alberta receiving a Bachelor of Science in Electrical Engineering. During the last 41 years he has worked in the Energy Exploration industry in Canada, the United States, Europe, South America, the

Middle East and the Far East.

His technical area of interest led to publications of nuclear magnetic resonance applied to reservoir characterization. He was granted numerous US patents for developments of wireline pressure core technology. Don Westacott strongly considers training and technology transfer as an important part of his role within the E&P industry. Don accepted a role as guest lecturer at the

Colorado School of Mines providing instruction to a new generation of petroleum engineering students. Don was honored to be the Distinguished Speaker at the Harvard University Energy Panel Arab Conference. During 2020, Don received the prestigious Hart Energy Innovators Award.

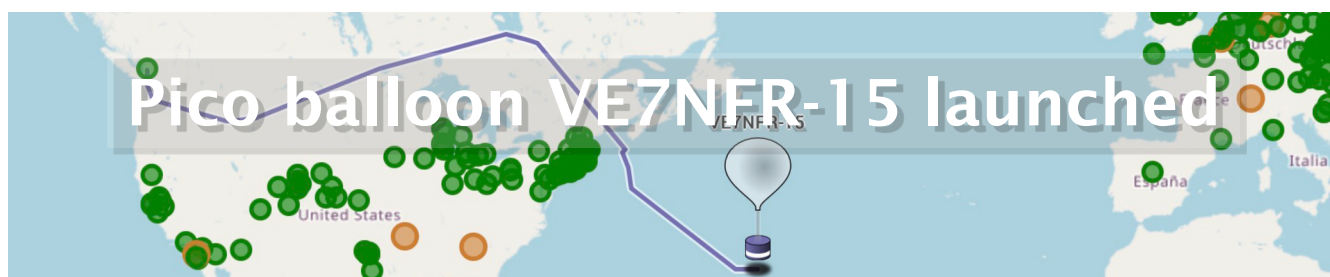
Don's first amateur radio license was issued in 1967 as VE6ANW. A year later achieved the advanced certification as VE6RI. I initially pursued 20-meter DX working using the Drake R4B / T4XB / L4B equipment and a 3 element Yagi/Uda antenna at 70 feet. Soon after, Don became interested in weak signal UHF propagation. Constructing of a "home brew" 70 cm radio system complete with 4CX250 linear amplifier based upon a novel resonant coaxial cavity design was completed. Three hundred (300) kilometer daily communications using over the horizon

tropospheric scatter was achieved between his Edmonton QTH and VE6JX located in Calgary, Alberta.

After more than 50 years have passed, Don have rejoined the amateur radio ranks and currently active on 20 meters and VHF / UHF bands. I was granted the KI5KGX call as an extra class USA amateur operator. Subsequently, we moved to Canada, and I reinstated my Canadian amateur radio certificate and requested my current call VE6HQ.

Don and his wife Marilyn enjoy the success of their sons Matthew and Andrew.

During 2023, Don presented a webinar on UHF Test Equipment, which may be found at: <https://vimeo.com/906428996>)



We are happy to let everyone know we have another Pico balloon aloft. We launched Friday from Kwantlen Park Secondary School as a follow-up to our presentation to RF/Comms class being taught there by Adam VE7ZAL with help from John VE7TI. We appreciate everyone's contribution to the GoFundMe that made this possible and a special thank you to the school who paid for the hydrogen cylinder.

The balloon survived its first 24 hours, which is always a key milestone. It is presently (noon pacific Saturday) over southwest Montana at 12,000m which is very good. We hope to exceed our last record of 2.5 laps of the Earth. You can track the flight here, which will show the last 3 days of travel (callsign VE7NFR-15 - as it is our 15th Pico): amateur.sondehub.org You can also find the source data and grid square derived from ham radio stations worldwide, receiving the 27mW 14MHz WSPR. Search for VE7NFR here: wspn.net

A short video is available on YouTube showing the preparations and the launch here: <https://www.youtube.com/watch?v=CtlrkOC8w8g>.

Thank you to Simon Davies for taking the video. We had hoped to have drone footage as well, but we didn't get anything interesting enough to share -maybe next time.

Thank you to everyone again for your contributions. Please note that we have turned off the GoFundMe now as we have exceeded our expectations and plan to use the remaining funds for a planned high-altitude balloon launch in late July or August.

~ 73 from the team as always, VA7SL, VE7NZ, VE7KW, VE7RW, and VE7TOA.



The 'Silent Squelch':

How California AB 1043 Could Kill Open Source Ham Radio



by ERIK PERSSON VE7ZQ

Amateur radio has always been a hobby of volunteers, experimenters, and self-taught engineers. We pride ourselves on building the tools we use, from homebrew antennas to the open-source software that powers our digital modes. But as of 2026, a new legal hurdle in California is threatening to mute the very software that keeps our hobby alive—not just in the Golden State, but across the country.

The [Digital Age Assurance Act \(AB 1043\)](#) was signed into law with enforcement set to begin on January 1, 2027. While its stated goal is to protect minors from “addictive” or “harmful” content, its technical definitions are so broad that they inadvertently sweep up niche, volunteer-driven open-source projects.

The Regulatory Burden: A “Compliance Trap”

The law creates a massive technical and legal mandate for any entity classified as an Operating System Provider, an Application Developer and a Covered Application Store.

- The OS Mandate: Any OS must provide a mandatory age-declaration interface at setup and provide a real-time “age signal” API that apps can query.
- The “Updated” Trigger: Any app updated on or after January 1, 2026, is legally required to request this signal. If a developer pushes a simple bug fix today, they suddenly “opt-in” to the entire regulatory framework.
- The Penalty: Fines reach \$2,500 per affected child for negligence and \$7,500 for intentional violations. For a hobbyist project with \$0 in revenue, a single enforcement action can be an “extinction-level event.”

The “All-in-One” OS Trap: The Burden on ISOs

For projects distributed as a bootable ISO (a complete, standalone Operating System), the impact of AB 1043 is immediate. Under the literal text of the law, these projects are no longer just “apps”—they are Operating System Providers.

1. DragonOS & Skywave Linux

These distributions are the gold standard for Software Defined Radio (SDR) and signals intelligence. Because they provide the entire environment, the maintainers are now legally tasked with building California's mandatory age-gate into the system installer. For a project run on "freedom and free beer," the cost of adding state mandated tracking and verification APIs is a non-starter.

2. arcOS (Amateur Radio Community OS)

A modern, Mint-based distribution focused on standardized digital communication. Because arcOS is intended for portable "plug-and-play" use with devices like the Digirig, AB 1043's requirement for a mandatory age-declaration interface at account setup adds a layer of friction and confusion that could hinder rapid deployment during emergency drills or in-the-field operations.

3. Andy's Ham Radio Linux (KB1OIQ)

One of the longest-running and most consistently updated distributions, this project provides a full Debian-based Live environment. Since it is updated multiple times a year (with Version 26e hitting in Jan 2026), it triggers the 2026 mandate immediately. The developer becomes legally responsible for ensuring every preinstalled tool correctly handles a mandatory age signal.

The "Script" Trap: Why 73 Linux is at Risk

You might think a project like 73 Linux is safe because it is technically a set of scripts run on top of an existing OS like Debian. Unfortunately, the law focuses on "functional control" rather than file types and implementation details.

1. The "Environment Controller" Problem

AB 1043 applies to any entity that "controls the operating system software." By providing a script that transforms a standard OS into a "Ham OS"—changing the desktop, adding custom repositories, and managing core utilities—projects like 73 Linux can be legally classified as the entity in "control" of the user's experience.

2. The "App Store" Liability

Even if a project isn't considered an "OS," its installation menu (like the bapp system) could be classified as a "Covered Application Store." The

law defines an app store as any interface used to download or launch applications. If your script provides a menu to install FT8 tools or SDR drivers, California law expects you to have a built-in age gate before those downloads occur.

At-Risk Software: Specific Nuances

The risk extends to the most popular tools in our kits. Here are some examples:

- **CHIRP (Radio Programming):** Updated almost weekly to support new radios. Every update after Jan 1, 2026, forces the team into the compliance loop.
- **WSJT-X & JS8Call:** These digital mode core applications are often "respun" by third parties. Under the law, every person who forks and re-releases a modified version could be held responsible for ensuring the age signal API is queried (WSJT-X Improved, JTDX, WSJT-Z).
- **Dire Wolf (APRS):** Often runs on "headless" systems (like a Raspberry Pi with no monitor). AB 1043 mandates an "accessible interface" at setup. How do you implement a graphical age-gate on a terminal-only TNC?
- **Every app that enables communication with another amateur radio operator:** So many of our apps allow communication with adults globally. As a developer you now have "actual knowledge" that a user is 12, but if the app doesn't have a specific "minor-safe" mode or parental control, the app developer is knowingly providing and "adult" service to a child. This is now a \$7,500 / "intentional violation".

The "California Effect": A National Threat

This isn't just a California problem. Because developers rarely maintain two separate versions of a free app, the restrictions required for California will become the default for everyone.

- **The "California Blackout":** We are already seeing projects announce they will block California IP addresses to avoid the risk. MidnightBSD took the unprecedented step of modifying its license to explicitly exclude California residents. This highlights the "nuclear option" many projects are considering. This cuts off one of the largest ham populations in the US from global innovation.



COMPLIANCE NOTICE: RESIDENTS OF CALIFORNIA

Effective January 1, 2027, this software is not authorized for use, download, or execution within the State of California.

Due to the excessive liability risks and technical mandates created by AB 1043 (Digital Age Assurance Act), the developers of this project cannot provide the mandated age-assurance infrastructure. By downloading this software, you affirm that you are not a resident of California and are not accessing this software from within California borders. Use of this software in California constitutes a violation of the License Agreement.

- **The Copycat Crisis:** Other states are already drafting similar bills. Without an explicit exemption for hobbyist-led, non-commercial software, we face a patchwork of 50 different laws that make it legally impossible to release a simple ham radio app.

The spirit of ham radio is defined by the freedom to experiment, build, and connect. If we allow fear of fines and legal fees to become a barrier to innovation, we aren't just losing software but the next generation of engineers and amateur radio operators.

~ Erik VE7ZQ

*Reprinted from The NSARC Contact,
Newsletter of the North Shore Amateur Radio Club
22 March 2026 Number 2613*

AB 1043 appears to be a broad age-assurance law aimed at operating systems and app distribution, not a law that directly bans open source software. In plain English, it seems to require device and OS makers to ask for a user's age or date of birth during setup, pass along an age category to apps, and use that signal to help control what minors can access.

What it is trying to do

The bill's basic idea is: when someone sets up a new device or account, the system should know whether the user is a child, teen, or adult, then use that information to shape app-store access and app behavior. Supporters frame that as a child-safety measure, especially for online services and apps that may expose minors to age-restricted content.

Why open source people are alarmed

The worry is not that AB 1043 says "open source is illegal." The worry is that its definitions may sweep in software ecosystems that were never meant to be treated like centralized app stores, including Linux distributions, package managers, and volunteer-run projects. Open source software is often distributed by many independent maintainers, mirrors, and repositories, so a rule written for centralized platforms can become hard or impossible to implement cleanly.

Why amateur radio software is mentioned

Amateur radio software is often small, niche, and globally shared by hobbyists, with code distributed through Git repos, package managers, or direct downloads rather than a commercial app store. If the bill's language is read

too literally, some people fear it could force even benign tools to participate in age-signal machinery that they were never designed to support. That is why hobby developers and ham-radio communities see a risk of overreach: the law may not target them directly, but they could get caught in the net.

What the practical impact would be

For big commercial platforms, the burden is mainly compliance work: collect age data, share an age category with apps, and maintain the required interfaces. For open source projects, the impact could be more disruptive: they may have no login system, no central user database, and no way to verify age across forks, mirrors, and offline installs. That creates a real risk of two bad outcomes: either projects add intrusive tracking/account systems, or they avoid California users, which clashes with open source norms and licenses.

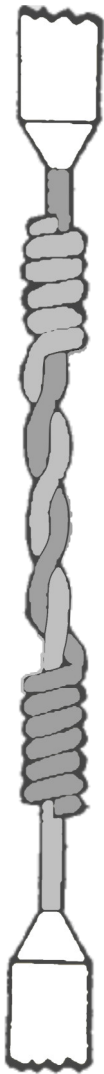
Plain-language takeaway

The simplest way to think about it is this: AB 1043 is trying to make the operating system itself help enforce age-based rules, instead of leaving that job only to individual apps or websites. That may work, at least in theory, for centralized phone and app ecosystems, but it becomes messy for Linux, free software, and hobby software distributed by volunteers around the world. So the concern is less "this bill bans open source" and more "this bill may accidentally make normal open source distribution much harder."

~

The Splice Must Flow

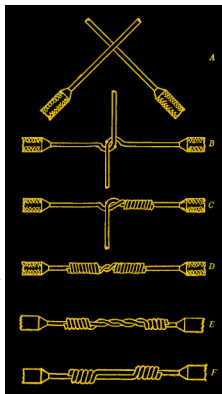
based on an article by AL WILLIAMS - HACKADAY



In the HACKADAY article "[The Splice Must Flow](#)," Al Williams explores the fundamental yet often overlooked art of wire splicing. While modern electronics have largely shifted toward printed circuit boards, manual wiring remains essential for many projects. Williams emphasizes that a successful splice requires more than just making wires touch; it must ensure adequate contact area for current flow and withstand environmental stressors like vibration and temperature fluctuations.

The article highlights several key splicing techniques:

- **The Western Union (Lineman's) Splice** *[right]*: Considered the "gold standard," this century-old method involves wrapping wires around each other to create a mechanically robust joint. When soldered, it is often stronger than the wire itself *[see below]*.
- **Pigtail Splice**: The most common method, involving twisting two ends together. While simple, it is prone to loosening under vibration and is typically secured with a wire nut.
- **Britannia and Fixture Splices**: Used for thick, rigid wires that are difficult to twist. These involve placing wires end-to-end or



side-by-side and binding them with a smaller wrapping wire.

- **Scarfed Splice**: A specialized joint where large wires are filed into tapers and bonded, similar to carpentry joints.

Williams notes that while organizations like NASA generally prefer controlled, repeatable processes like crimping, the Western Union splice remains a highly respected manual technique. The article also touches on specialty splices, such as "T" taps for tapping into existing lines, and the challenges of splicing multi-conductor cables where maintaining wire spacing is critical.

Ultimately, the author concludes that while modern connectors—like Wago blocks or terminal strips—are often safer and more reliable, knowing how to execute a proper manual splice is a vital skill. The "right" choice depends on the specific electrical load and mechanical demands of the environment.

There are some informative how-to video links with the article:

Western Union Splice: <https://youtu.be/SKr3h1cHliM>

Britannia Joint: <https://youtu.be/bfpagotolak>

~ Al Williams
HACKADAY

The Gold Standard

Practical Electric Wiring was published in 1921 and it provides a fascinating glimpse into the practices of the day, many of which are still applicable and in use. You can read/download it at <https://ia600704.us.archive.org/17/items/practicalelectri00shar/practicalelectri00shar.pdf>

Harnessing the Sporadic-E Phenomenon:

Unlocking the "Magic Band" for Amateur Radio Communication

by JOHN SCHOUTEN VE7TI

Sporadic-E propagation stands as one of the most thrilling and unpredictable phenomena in amateur radio, offering operators the rare opportunity to achieve long-distance communication on very high frequencies that would normally be confined to line-of-sight ranges. This captivating mode of propagation occurs within the E layer of the ionosphere, situated approximately 50 to 90 miles above the Earth's surface, where dense, irregular patches of ionization form seemingly at random. These ionized clouds possess the remarkable ability to reflect and refract radio signals at frequencies far higher than typically expected, enabling extraordinary long-distance contacts on bands ranging from the 10-meter HF band at 28 MHz all the way up to the 2-meter VHF band at 144 MHz, with the most dramatic and reliable activity occurring on the 6-meter VHF band at 50 MHz, a

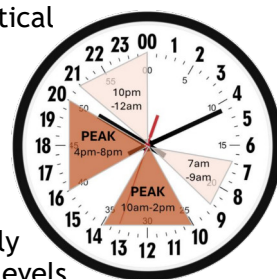
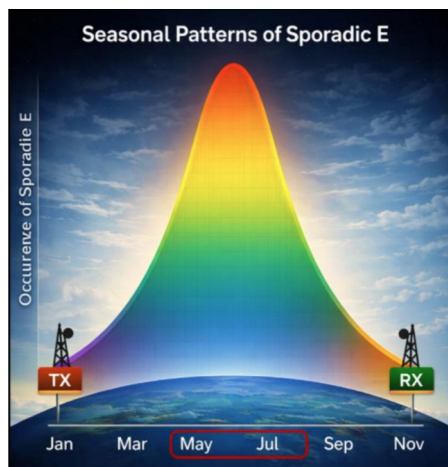
segment so renowned for this behavior that operators affectionately call it the "Magic Band."

What makes Sporadic-E particularly exhilarating is its inherent unpredictability, as these ionized patches can

appear abruptly without warning and dissolve just as quickly, transforming a completely silent band into a cacophony of distant signals within minutes and leaving operators in awe as stations hundreds or even thousands of miles away suddenly sound like local transmissions. Despite this capricious nature, experienced operators have identified distinct seasonal and daily patterns that govern Sporadic-E activity, with the primary season occurring during late spring and early summer in the northern hemisphere, typically from May through July, accompanied by a secondary but significantly weaker season appearing in December and early January.

The time of day plays an equally critical role, as propagation tends to peak during midday and early evening hours when solar heating energizes the upper atmosphere, with the most favorable window for strong, widespread activity generally spanning from late afternoon to early evening local time when ionization levels reach their maximum and the E layer structure becomes most conducive to sustained, occasionally multi-hop propagation extending across 2,000 to 3,000 miles or more.

The scientific mechanisms behind Sporadic-E formation remain partially mysterious, but several well-supported theories provide compelling explanations, including the wind shear theory which proposes that opposing high-altitude winds compress ionized particles into thin, dense layers,





while meteoric activity contributes ionized metallic particles such as iron and magnesium from disintegrating meteors, and atmospheric tides along with gravity waves help redistribute and concentrate these ions into localized clouds.

Signals propagated via Sporadic-E exhibit distinctive characteristics that seasoned operators readily recognize, including surprisingly high signal strength frequently

reaching S9 or higher even over considerable distances, rapid QSB fading where signal strength fluctuates dramatically within seconds, and the sudden onset of openings where a band completely quiet for hours can suddenly erupt with multiple stations appearing almost simultaneously. The typical skip zone distance for a single Sporadic-E hop ranges from about 300 to 1,500 miles depending on the density of ionization, with denser clouds producing shorter hops, although under favorable conditions multi-hop propagation can enable transcontinental communications spanning thousands of miles.

While the 10-meter band frequently benefits from Sporadic-E, particularly during periods of low solar activity, the 6-meter band remains the primary focus for enthusiasts due to its unique position at the edge of reliable ionospheric reflection, though occasional openings can extend up to the 2-meter band during rare, intense events. A variety of operating modes prove effective during these openings, including SSB for phone communication, CW for weak-signal work, FM often leveraged through band repeaters during strong openings, and digital modes such as FT8 which serve as incredible tools for detecting and leveraging weak or emerging propagation, with many successful operators leaving their digital software platforms focused on the 6-meter band and diligently monitoring QSO activity during peak daily periods.

Detecting Sporadic-E openings requires a combination of focused attention, operating experience, and modern technological tools, including monitoring 6-meter beacon frequencies

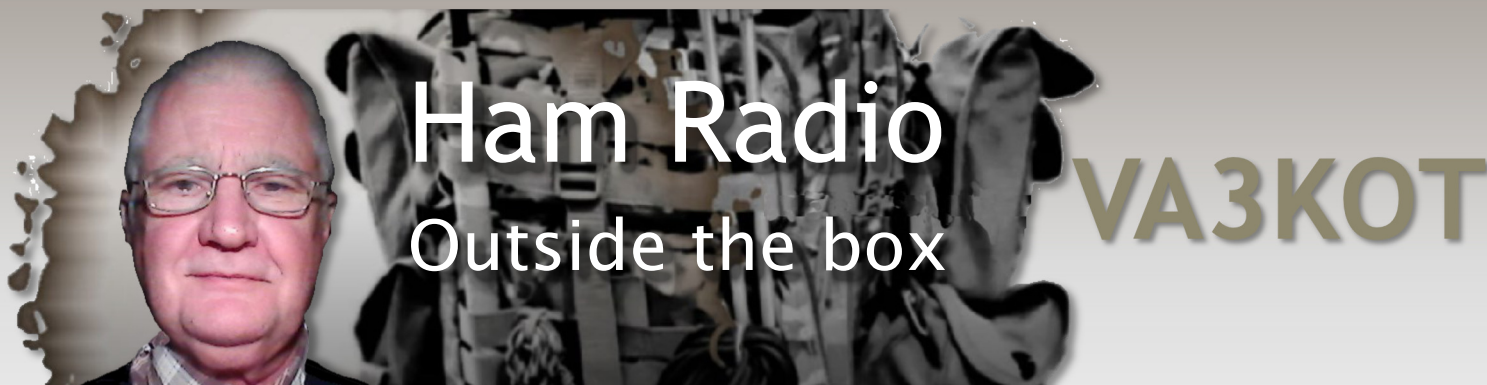
between 50.060 and 50.080 MHz for continuous CW signals that indicate changing conditions, scanning the SSB calling frequency at 50.125 MHz and FM simplex frequency at 52.525 MHz, consulting DX maps and MUF tracking platforms for near real-time activity reports, and observing a sudden increase in decoded FT4 or FT8 signals from distant locations. An intriguing alternative detection method involves scanning the commercial FM broadcast band from 88 to 108 MHz for non-local FM stations appearing from hundreds of miles away, serving as a real-time indicator of Sporadic-E activity at higher frequencies.

Successful operation during these fleeting events demands both thorough preparation and swift action, as openings can be brief and operators must be ready to transmit immediately upon detecting signals, calling CQ frequently to maximize contact opportunities while slowly tuning across the band since no optimal frequency exists and signals can appear anywhere, with radios featuring SDR band scopes proving particularly valuable. Antenna choice certainly influences performance, but elaborate setups are not strictly necessary, as omnidirectional vertical antennas can perform remarkably well during openings alongside bidirectional antennas aligned primarily east to west, reflecting the tendency for signals to propagate most commonly along east-west paths in mid-latitude regions. Maintaining detailed historical logs of Sporadic-E QSOs, including information such as time, frequency, distance, and signal reports, helps operators identify patterns over time and provides valuable insights into potential future openings.

By understanding the behavior, seasonal patterns, and operational strategies associated with Sporadic-E propagation, amateur radio operators can transform what might seem like random, unrepeatable events into a rewarding and increasingly predictable aspect of their operating skills, turning the "Magic Band" into a reliable gateway for remarkable long-distance contacts that showcase the enduring wonder of radio communication.

~ John VE7TI with inspiration from Greg Mihran KJ6ER. Greg's website with a detailed description, antenna suggestions and 'How-To' work Sporadic-E is at kj6er.net

Images courtesy of Greg KJ6ER



Be gone pesky radials!

by JOHN CORBY VA3KOT



John Corby VA3KOT resides in Owen Sound, Ontario but is more often found operating CW out in the "Big Blue Sky Shack". He especially enjoys activating parks for the POTA program and blogging about his experiences at HamRadioOutsideTheBox.wordpress.com

One of the biggest bugbears of portable operations in a public space when using a vertical antenna is having to lay out radials - either on the ground, or raised. I have told the story of the dancing lady before on this blog; she performed a little jig when advised to be careful of the wires on the ground. Some of the parks I frequent are quite small and busy in the summer months, so I always have to be cautious about creating a potential hazard for other park users.

Even if I find a nice quiet area along a trail, there is often limited space in which to spread my wires. Alternatively, I may be on a mission to operate with multiple rapid deployments - drop my pack, super fast setup, operate, move on. A small vertical antenna is a very convenient way of getting on the air with minimum fuss - except for the radials.

What is the function of radials?

It doesn't matter whether the radials are on the ground or raised, they form a counterpoise - "the other half" of an antenna. The current flowing through the radial system controls the current flowing into the radiating element. An efficient set of radials allows maximum current to flow through the whole antenna system. The current flowing in the radiating element is equal to the current flowing into the radials. More current equals more signal being radiated.

We can throw a single wire on the ground and call it a counterpoise - there seems to be a magic length of 17 feet, at least that's what we

may be led to believe from reading many online accounts. Seventeen feet may be approximately a quarter wave on 20m, but it is detuned by proximity to the ground. Is it efficient? Well, it's better than nothing. Without that wire the operator may become the counterpoise - RF gotta go somewhere.

Transceivers can't count radials

Let's pretend that transceivers have eyes for a minute. When the transceiver looks at a counterpoise - whether its made of wire radials, or has a callsign - all it really "sees" is a combination of Resistance, Inductance and Capacitance (RLC). Transceivers can't count radials - you read it here first! Resistance, Inductance and Capacitance are seen as impedance. An efficient set of radials has a low impedance to RF which allows maximum current to flow. So isn't the current flowing into the counterpoise system really the most important factor in determining its efficiency?

Hams endlessly debate about how many radials make an efficient counterpoise. Is it 4; is it 16, or maybe 128? The debate is pointless unless other factors are also considered. The correct number is just ONE - if your antenna is erected in seawater. I want to propose another number - ZERO and, in the true spirit of scientific endeavor, I have empirical evidence to support my assertion. If an assertion cannot be verified

by experiment it just ain't so.

"I would rather have questions that can't be answered than answers that can't be questioned."

— Richard Feynman

Here is the experiment

The SWR [*below*] is difficult to read due to the bright sunlight; it reads 1.79.

The strange blue thing in the antenna wire is a small loading coil.

Observe the higher deflection on the RF current meter after the GTU had been adjusted for maximum current in the counterpoise.

The experiment was conducted in the Ham Radio Outside the Box outdoor laboratory (my driveway). A welcome rise in temperature had melted the ice from my concrete driveway and, for once, the Sun was shining. I wanted to test a "de minimis" rapid deployment antenna that would also serve to verify my assertion about counterpoise efficiency.

The initial test was conducted with my 20m emergency wire antenna (a coil-loaded 13ft wire). Instead of radial wires I used my GTU (Ground Tuning Unit).

A GTU is a series connected L-C device. There is a sensor circuit connected to a small analog



The SWR is hard to read due to the bright sunlight – it is 13. The GTU had not yet been adjusted for maximum counterpoise current. Observe the small deflection on the RF current meter.



The SWR is difficult to read due to the bright sunlight; it reads 1.79. The strange blue thing in the antenna wire is a small loading coil. Observe the higher deflection on the RF current meter after the GTU had been adjusted for maximum current in the counterpoise.

meter for observing the current passing through the device. The GTU case is a Hammond aluminum box which is electrically connected to the ground side of the GTU. The input to the GTU is a short wire connected to the shield of the coax at the antenna end.

To monitor the current in the radiating element an RF current meter was inserted into the radiator wire. The current meter is basically a GTU without the tuned circuit.

The GTU was placed directly on the concrete driveway; its aluminum box forming a capacitive connection to ground. It would have been more effective to perform the experiment on grass, but my lawn is still buried under a miniature glacier formed by another dreadful winter that isn't over yet.

The 20m emergency antenna is nominally resonant when a counterpoise is attached so no further tuning was required. The absence of radials required the GTU to do the job of maximizing the current flow on the ground side of the antenna.

At the start of the experiment there was a small current flowing to ground. A similarly small current was observed flowing into the radiator wire (see images). The antenna analyzer recorded an SWR of 13:1.

As the GTU was tuned the ground current increased. It was observed that the current in the radiator also increased. Neither meter was capable of measuring the value of current, so the readings simply represented the relative flow of currents in the counterpoise and radiator. As the ground current peaked the antenna analyzer showed a much improved 1.79:1 SWR.

Quod Erat Demonstrandum?

So did that little semi-scientific experiment prove the point? Well kinda sorta. It established a correlation between ground side current and radiator current. But would it QSO? No, definitely not; it's just a dumb collection of wire and electronic components - I make the QSOs eh?

Next step – hook up a radio

This is the bit where I boldly went on to risk a radio in pursuance of scientific inquiry. First, the

antenna was replaced with my “tactical” 9.5ft whip wearing its finest top hat. The whip was mounted on a small tripod out on the driveway. Even with a googol (10e100) of radials this antenna would not be resonant on the 20m band. That called for deployment of my QROp L-match tuner. The radio called into service for the experiment was my old Yaesu FT-897 set for a blistering 20 watts. Since the antenna is a compromised short vertical my QRP radios were granted liberty for the day. A little muscle was called for to ensure a decent signal could be launched up to the edge of space to pound the ionosphere.

The L-match was adjusted for resonance ($X=0$ @ 14.113MHz), a low SWR reading on the radio, then the GTU was adjusted to max out the ground current, which lowered the SWR reading on the radio even further. Everything was ready for launch but countdown was paused for one further refinement.

A large plate for pizza?

A GTU is usually used in combination with a capacitance plate laying on the ground. The GTU body is itself a very small capacitance plate, but maybe a larger plate would enhance the ground side current flow. A quick hunt around the Ham Radio Outside the Box HQ turned up a number of options. One of the options was an old pizza pan. It worked - i.e. it raised the ground current a little, but I really couldn't see carrying a disgusting retired old pizza pan around as part of my portable ops kit. A little further searching resulted in a small piece of what looked like chicken wire. It looked much nicer and it worked even better than the pizza pan.



GTU atop its chicken wire capacitance plate. The large toggle switch bottom right is a bypass switch. The knob under the meter selects one of three inductors. The knob at top right adjusts the deflection of the meter needle. The large knob is for the tuning capacitor.



Final setup. This picture was taken before the chicken wire capacitance plate was in place. The antenna was fed by a 10ft RG-8 coax through a Common Mode Current choke (on a FT240-31 toroid)

The final setup – will it QSO?

Do I have to say it again? I make the QSOs not the dumb bits of wire. Well, could I make some contacts with this ZERO radial short vertical antenna system? Here is a picture of the setup.

Once again, a concrete driveway

is not the best test of a GTU-based zero radial counterpoise system. The glacial layer of frozen, compressed snow on my lawn may not melt for another few weeks so one has to just make do with whatever nature allows.

I scanned the bands seeking somebody calling CQ and found a station in Connecticut doing a POTA activation. Grabbing my CWMorse paddle key I threw out my callsign and waited to hear if he heard me. Connecticut might be a little close to my QTH in southern Ontario for a vertical antenna with low angle radiation. Anyway, he heard me and sent me a 539 report. I responded with a 579. Contact was made.

A popular mantra among hams is “one is none and two is one” so I figured another contact would hammer a nail in it and seal the proof.

A little more search and pounce revealed another POTA activator in Virginia. Still quite close but my contact there earned my modest setup a 579 report.

Both those contacts were on 20m and I wondered whether another band would also work. I tuned up on 15m but the band was frantically busy with high speed CW traffic and I didn’t want to slow anybody down with my low power into an experimental antenna so I pulled the plug.

So there we have it. A very simple, rapid deployment field portable vertical antenna with zero radials. Now how am I going to make the ladies dance?

~ John VA3KOT



I Heard Voices On The Super Illegal 934MHz CB Radio Band

This video is about UK amateur radio operator M3HHY hearing voices on an illegal 934 MHz CB radio band. It explores the unusual signals, that the operator found while monitoring the band, and why this frequency is considered outside legal CB use. The author used a mix of radio-scanning, signal-catch, and commentary on unauthorized transmissions. View the YouTube video at: https://youtu.be/poit_QRN89o

Zero Retries

NewTechHams



by STEVE STROH N8GNJ



Steve Stroh N8GNJ is the Editor of the Zero Retries newsletter (www.zeroretires.org) which promotes technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology.

When not writing Zero Retries, Steve experiments with Amateur Radio data radio systems in N8GNJ Labs (his shop) in Bellingham, WA,

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It was great meeting SARC members in person at the April 2026 meeting. I spent most of that presentation explaining the rise of NewTechHams. Very generally, NewTechHams are those that generally trend younger, technically oriented (from career or interest), and want to experiment with radio technology. One example of a NewTechHam is an engineering student that wants to experiment with Software Defined Radio (SDR) (often GNU Radio¹), and gets their Amateur Radio License so that she can experiment with different portions of spectrum that is available to Amateur Radio Operators.

I consider NewTechHams to be a distinct new demographic that is coming into Amateur Radio that's, unfortunately, being too often overlooked by "mainstream" Amateur Radio. I've been chided by my wife Tina KD7WSF for dwelling too much on what NewTechHams aren't (interested in many "mainstream" Amateur Radio activities). That's a valid point - what NewTechHams aren't interested in can be divisive. Thus I need to rework my April, 2026 SARC meeting presentation to reflect what NewTechHams are interested in, and want to do in their Amateur Radio career in the 2020s and beyond.

Earlier "bulges" of Amateur Radio Operators were the result of personnel trained on radio during World War II, the rise of Citizens Band radio, the removal of the Morse Code Requirement, and in the 2020s, NewTechHams coming into Amateur Radio out of technical interest. There are many reasons NewTechHams are finding their way into Amateur Radio, but two major factors are SDR and Meshtastic / MeshCore / MeshCom. Each of those Mesh variants have their use cases and passionate advocates.

Hereafter, I'll abbreviate them as MeshX.

The reason Software Defined Radio is attracting NewTechHams is that they are comfortable "hacking" in software. One example is Linux being entirely open source. One can (and do) endlessly "fork" Linux into new distributions, to run on endless varieties of computer systems. It still boggles my mind that 64-bit Linux can be run on the \$15 Raspberry Pi Zero 2W with "only" 512 MB of RAM. The equivalent of Linux as an open source operating system for Software Defined Radios is GNU Radio. Much like Linux incorporates libraries of pre-written code, GNU Radio incorporates flowgraphs of pre-written code. It still amuses me to write that those familiar with GNU Radio, when they need a new type of radio, they can just sit down and write one.

The reason MeshX is attracting techies curious about radio technology is that they can get started for very low cost and participate in their local and regional networks immediately. The density of MeshX networks in urban areas is such that there's always someone to (text) chat with. Text chatting is a key distinction - that is the preferred method of communication for most MeshX participants.

Other attributes of MeshX that appeal to (potential) NewTechHams:

- There is ample peer support available in ways that they're comfortable with such as web pages, YouTube videos, and Discord text chats.
- There are uncountable hardware options, with new and different options becoming available literally every week. It's possible to combine multiple units into new configurations.

It's easy for nearly any techie to get involved in MeshX because they are largely insulated from the complexities of radio. MeshX uses LoRa², a very robust implementation of Chirp Spread Spectrum that trades relatively low bandwidth for a robust digital modulation that achieves surprising range.

Another radio factor that MeshX is largely insulated from is spectrum use. In North America, most MeshX operates on the 902-928 MHz band³, which is shared with (low power, restricted technical characteristics) unlicensed

users, and Amateur Radio. Because of the use of LoRa, which is robust enough to "power through" other low power signals, generally MeshX "just works".

Thus Software Defined Radio experimenters, and MeshX users are large populations of potential NewTechHams, and hopefully by the end of 2026, there will be a number of radio options, new networks, and new technologies that will be attractive to these SDR experimenters and MeshX users.

The Radio We Digital Hams Want and Need

New models of radios are on my mind as Hamvention 2026⁴ is held in Xenia, Ohio, USA May 15-17. This year my newsletter Zero Retries will have a booth at Hamvention for the first time.

Its widely expected that Kenwood will announce its TM-D750A⁵ mobile radio, and Icom has begun teasing another new radio. While those radios will be nice, with a pretty front panel, and many, many features, for me the primary feature of interest on the TM-D750A is that it has a "digital" (flat audio) connector on the rear panel. That means that I would be able to use the TM-D750A with an external audio adapter and be able to operate 25 kbps using VARA FM on a standard 12.5 kHz VHF / UHF channel, at up to 50 watts of power. One nice feature of the TM-D750A is that includes the North America 222-225 MHz band, but at lower power than the 144-148 MHz band and the 420-450 MHz band (430-450 MHz in Canada). All the other features of that radio - the onboard TNC (1200 / 9600 bps AX.25 packet and APRS), D-Star (including D-Star data and DV-data), audio recording, etc. are of minimal interest.

Some Yaesu mobile radios⁶ also provide a "digital" (flat audio) connector on the rear panel.

But current Icom mobile radios do not include a "digital" (flat audio) connector, nor do any DMR radios from vendors in China.

At Hamvention 2026, we won't see the VHF / UHF radio that we digital Hams want and need. The reason is that the big vendors like Kenwood want to sell higher-end radios like the TM-D750A, and are ceding the market for lower cost mobile

radios to the vendors from China. But someone is going to figure out that the “digital Hams” market exists, and wants to buy a radio that they want and need:

- Ideally, no or minimal front panel. Minimum indicators - Power switch, Power On indicator, Transmit indicator.
- Flat audio connection - bypass the FM pre-emphasis and de-emphasis voice stages (or don't have pre-emphasis / de-emphasis voice stages at all),
- Incorporate a wide bandwidth audio interface suitable for operating (as an example) VARA FM Wide mode (25 kbps)
- 25 watts / 50 watts
- Ideally, dual band 144-148 MHz / 420-450 MHz, but single band is adequate.
- Really ideally, inclusion of the 222-225 MHz band or a single band unit.
- Remote control of all parameters especially transmit and receive frequency, settable with standard Rig Control commands.
- USB-C interface for audio input / output / PTT, and control functions.
- Large heatsink for passive cooling. Yaesu has this figured out. Kenwood prefers small heatsinks with (noisy) fans.
- Ideally, minimal RX / TX switching time.

Why is such a radio needed? What difference would such a radio make? What audience would it satisfy?

First, legacy Packet Radio, especially 1200 bps packet radio, feels old, tired, and slow to NewTechHams (and us OldTechHams). Even 9600 bps isn't that exciting because it's fussy, required special radios (the original reason for the “digital” (flat audio connector), and the 9600 bps modulation is “fragile”. We have the capability to do better 9600 bps by adding Forward Error Correction (FEC)^{7 8} to fix errors proactively. But, radios with 9600 bps built-in, such as the venerable Kenwood TM-D710A and almost certainly the forthcoming Kenwood TM-D750A don't incorporate FEC.

Second, as much as I'm fond of pointing out that we now have real data radios specifically for Amateur Radio, such as New Packet Radio⁹, that

can do 100 kbps - 1 Mbps, those are built-for-purpose radios that most Amateur Radio Operators aren't comfortable with such technology, particularly when they use larger portions of Amateur Radio spectrum, such as 100 kHz to 1 MHz bandwidth.

Third, the ultimate solution, the ideal Amateur Radio data radio is a fully software defined radio. I've written previously about the LinHT^{10 11} Software Defined transceiver in a portable radio form factor. There's nothing about LinHT that restricts its technology to being a portable radio - a LinMobile is entirely feasible. Arguably, a LinMobile is actually more feasible than a LinHT, but the very talented developers of the LinHT decided to tackle a handheld SDR first.

So a data radio as outlined above is a reasonable middle ground between existing VHF / UHF FM radios, and the unfamiliar future of dedicated data radios and future higher power SDRs like a LinMobile.

In mid-2026, the primary use case for such a radio is to use VARA FM¹² which can achieve 25 kbps in a standard 12.5 kHz VHF / UHF FM channel. VARA FM is largely used for Winlink and Emergency Communications networks. But there are additional, more exciting new developments in progress that can make very good use of such a radio, taking us beyond VARA FM. I'll highlight only two of them.

The first new development is an offshoot of the IP400 Project¹³ that is a collaboration¹⁴ between the IP400 team and the developer of the NinoTNC¹⁵ to develop a usable “Audio OFDM”¹⁶ modulation. OFDM is Orthogonal Frequency Division Multiplexing¹⁷, and it is a technique that takes a channel (in this case the approximately 3 kHz flat audio bandwidth of a typical VHF / UHF FM radio) and divides it into multiple subcarriers. Then, each subcarrier is managed independently, almost like it's a unique channel. The result is a very robust modulation that can handle a lot of interference, fading, and other effects on a radio channel that cause problems for simpler modulation methods. OFDM is very computationally intensive, which is why VARA FM required the computing power of a typical Windows PC. OFDM in Amateur Radio is becoming more practical now in Amateur Radio because we have more powerful and less expensive compute power available for such tasks. As an example of

this trend, the very powerful HF digital voice mode FreeDV RADE¹⁸ formerly required a Windows or other computer, but can also be operated on an “embedded appliance” Raspberry Pi 5 computer other small Windows computers in the same price class. The IP400 / NinoTNC collaboration for Audio OFDM is still in development, but it looks very promising and relatively near term. Likely we’ll see the first Audio OFDM “modems” available by Fall 2026, and it seems likely that they’ll be able to exceed the 25 kbps maximum speed of VARA FM, and be more flexible. And, best of all, they’ll be open source so can be adapted to any / all computer platforms and probably embedded devices.

The second new development is called Mesh Operations Protocol (MOP)¹⁹, a project by Stefaan Desmedt KO6IKR. MOP also uses its own variant of OFDM modulation, but MOP targets lower speed (4800 bps), short transmissions, and integral Mesh Networking. MOP makes use of existing VHF / UHF FM radios. Like the IP400 / NinoTNC collaboration for Audio OFDM, MOP is in development, but very promising.

Many will posit that we have suitable radios already - largely repurposed surplus commercial VHF / UHF radios, especially those made by Tait (based in New Zealand). When you can find the right models of such radios²⁰... that have some usable (Amateur Radio) life left (not too abused), then yes, those are ideal Amateur Radio data radios (absent the ability to remotely change frequencies, and dual band capability).

But I posit that a purpose built Amateur Radio data radio, as outlined above, would sell reasonably well beginning in late 2026 with the emergence of the IP400 / NinoTNC Audio OFDM mode, and hopefully Mesh Operations Protocol.

Fellow Pacific Northwesterners, have a great, glorious early summer here in this incredible corner of North America!

~ Steve N8GNJ

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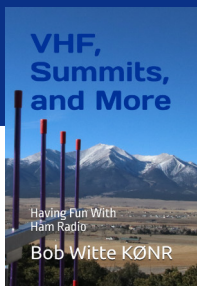
Three Types of SOTA Contacts

by BOB WITTE KØNR



Bob Witte KØNR has a great blog site at <https://www.k0nr.com/wordpress/>

Bob is author of VHF, Summits and More



When I talk about doing VHF SOTA activations, people often wonder about what kind of contacts to expect. VHF propagation from a mountaintop can be surprisingly good, and the range of possible contacts runs from the routine to the remarkable. Having done a lot of these activations, I've noticed that VHF SOTA contacts tend to fall into three broad categories. Let's take a look at each one.

Type 1: The Local Contact (20–30 Miles)

This is the most common type of VHF SOTA contact, and it's what keeps most activations from getting skunked. A simple 2-meter FM handheld radio, a decent half-wave antenna, and a summit with good Height Above Average Terrain (HAAT) – that's all you need to make contacts with stations in the surrounding towns and valleys.

The typical range for this category is roughly 20 to 30 miles, with some variation depending on terrain. From most Colorado summits, this covers small mountain towns, outlying suburbs, or rural homesteads with a radio operator and a 2m FM rig. These are the chasers who have 146.52 MHz programmed in, monitor for activity, and are happy to give you a quick contact. Often, I'll catch mobile stations driving through the high country with their radio set on 2m simplex.

These contacts are the bread and butter of VHF SOTA. Mostly reliable, repeatable, and very useful for getting the four QSOs to get the activator points. Don't underestimate them.



Type 2: The Extended Contact (30–150 Miles)

Now it starts to get interesting. This category requires a bit more effort — both from the activator and the chaser. We're talking higher power, a better antenna, or both. On the summit end, a 3-element Yagi like the Arrow II provides about 6 dB of gain over a half-wave antenna, which makes a significant difference. It also helps to run more power than a handheld radio can, with 25 watts making a big difference. A home station using 50 watts with a quality high-mounted omnidirectional or beam antenna can significantly boost range on the chaser side.

These contacts are mostly still on 2m FM, although SSB and other modes can really help at these ranges. The contact might require pointing the Yagi in the right direction, asking the chaser to try a different antenna orientation, or just working a little harder to pull the signal out of the noise. These contacts are made at the margin, so every decibel of signal strength matters.

This category represents a real challenge, and that's part of the appeal. When you complete a contact at 100 miles with some rough terrain in the way, it feels like an accomplishment. You earned that one.

Type 3: The Exceptional Contact (150+ Miles)

These are the contacts that make you stop what you're doing and say "wow." Distances beyond 150 miles on 2m FM are not routine —

they happen when something special is going on. Three factors drive most of these exceptional contacts:

Favorable geography. Two high summits separated by a long distance can sometimes "see" each other in a way that lower-elevation stations cannot. In the Colorado high country, summit-to-summit contacts across large distances are possible when both operators are at altitude. The geometry just works out.

Favorable propagation. This is where it gets really fun. Sometimes enhancement occurs on the VHF bands, which means the signals become significantly stronger. Several elements contribute to this, though most link to tropospheric conditions. Tropospheric ducting can have a very strong effect, occurring when atmospheric conditions create a temperature inversion that takes VHF signals well beyond normal range. The ionosphere can also play a role, with Sporadic-E propagation opening up the 2-meter band unexpectedly, providing path distances of over 800 miles. This is rare on 2 meters and more common on the 6-meter band.

Modulation type. FM is a great mode for local and medium-distance contacts, but it is not the most efficient modulation for squeezing out long-distance QSOs. SSB and CW require significantly less signal strength to complete a contact compared to FM — a difference that can easily be 10 dB or more. That's a huge advantage when signals are marginal. So when the conditions are favorable but not quite strong enough for FM, switching to SSB or CW

can make the difference between completing the contact and just hearing a ghost signal in the noise. This is one of the reasons I've been enjoying the 2026 SOTA Challenge on 2m and 70cm CW/SSB — it pushes operators to explore what's really possible on these bands.

My best 2m FM contact from a SOTA summit is 245 miles (Mount Scott (W5O/WI-002) — that one was a keeper. My best 2m SSB contact was 372 miles, from Three Mile Mountain (W0C/SP-107) to NOLL in Kansas. Longer contacts are possible, but you have to be on the right summit at the right time, with the right chaser listening.

Which Type Is Most Common?

Type 1 is by far the most frequent, and Type 2 contacts are a regular occurrence for activators who show up with the right gear and a good summit. Type 3 contacts are not predictable, but they are not as rare as you might think.

The key takeaway is that VHF SOTA is not a one-size-fits-all experience. You can tune your station and operating strategy to optimize for any of these categories, or just show up with a handheld and see what happens. Either approach can work, and both are fun.

That's the universal purpose of amateur radio, after all.

~ 73 Bob KØNR

The original article is at: <https://www.k0nr.com/wordpress/2026/04/three-types-of-vhf-sota-contacts/>

Second Edition of VHF, Summits, and More

Big news — I'm proud to announce that the Second Edition of my book VHF, Summits, and More is now available. I've received tons of positive feedback on the first edition, published in 2019, and I decided it was time for an update. This new version is printed in color, which greatly enhances the photos and graphics.

This book is an easy-to-understand introduction to VHF/UHF ham radio with an emphasis on mountaintop VHF operation. I've enjoyed ham radio and writing about it ever since I received my first FCC license. Although I've used the ham bands from 160m to 3cm (10 GHz), I find the VHF and higher frequencies the most interesting. This is mainly because of the interplay between mountains, Height Above Average Terrain (HAAT), and VHF propagation. VHF has lots of spectrum, lots of modes, and lots of fun challenges.

For the second edition, I gave everything a fresh look. I updated every chapter and added 100 pages of new material. In Part I, the VHF tutorial section, I added new chapters to improve the treatment of basic VHF/UHF: Popular VHF/UHF Bands, Antennas, Coaxial Cables & Connectors, and WSJT-X Digital Modes. Part II covers topics that originated from my blog, often based on

questions I hear from newer hams. In Part III, which is focused on SOTA, I added several chapters on how to be successful doing VHF SOTA, and I added a few new trip reports. I also added some information on combined SOTA/POTA activations.

The book is available in two formats: a color print edition and a Kindle edition, both available from Amazon. The print version ships immediately; the Kindle version will follow shortly.

Order your copy now. Operators are standing by.
(Actually, just use the Amazon site.)

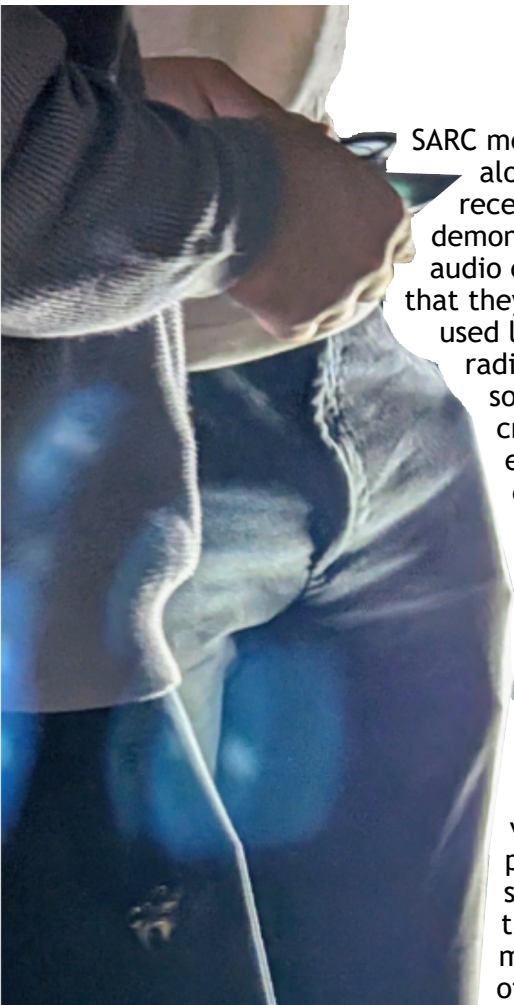
~ 73 Bob KØNR



Audio Using Light Modulation

A High School Project by Valentin VE7ZFR and Isaac

Valentin and Isaac Demonstrate the Transmission of Audio Using Light



SARC member Valentin VE7ZFR, along with his friend Isaac, recently gave the club a demonstration of a light-based audio communication system that they built. Their project used light photons rather than radio waves to transmit sound, making for a creative and impressive example of alternative communications technology.

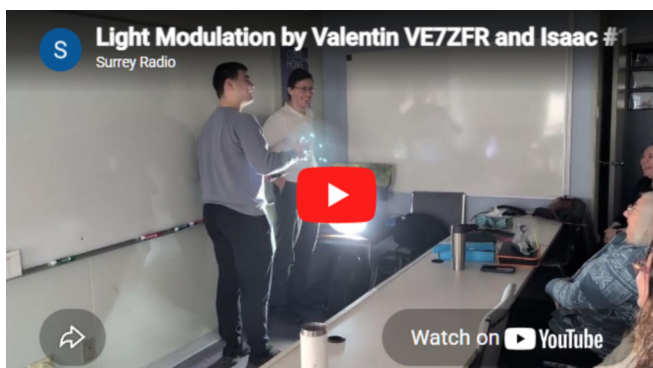
On the transmitting side, audio from a phone or other headphone-jack device was fed into an amplifier circuit. That circuit both amplified the signal and used it to vary the intensity of a powerful LED light source. In other words, the audio was used to modulate the brightness of the LEDs.

On the receiving side, a solar panel detected the changing light intensity and converted it back into a changing electrical signal. After filtering out the DC component, the remaining audio signal was amplified and sent to a speaker, where it could be heard clearly.

The system achieved a range of slightly more than 100 metres. To reach that distance, the builders used a 12V 8A battery, two LEDs, and a reflector lined with reflective film to direct as much light forward as possible. A reasonably large solar panel on the receive side was also important, since a larger panel captures more of the transmitted light.

This was developed as Valentin and Isaac's high school graduation project, and it offered a practical demonstration of how light can be used for communications. It was a very interesting presentation and a great example of the kind of experimentation and ingenuity that amateur radio operators always appreciate.

~ Reg VA7ZEB



KB6NU'S HAM RADIO

In the works:

New documentary on Martin F. Jue and his company, MFJ

by DAN ROMANCHIK KB6NU



Dan Romanchik

KB6NU blogs about amateur radio at [KB6NU.com](https://www.kb6nu.com) when he's not trying to figure out which way current flows. Dan teaches ham radio classes, and operates CW on the HF bands. Look for him on 30m, 40m, and 80m. You can email him at cwgeek@kb6nu.com

I found this post on reddit yesterday, and I loved the idea so much that I have volunteered to be the unofficial PR guy for this project. Say what you will about MFJ projects—and I have sometimes been critical myself about them—Martin and his company have played a big part in amateur radio for a long time. This is a story that should be told.

With the permission of the OP, Preston Booth, I'm republishing his post here. At the bottom of the post, you'll find a link to the documentary producer's website, where you can make a donation to the project. I made a small donation yesterday.

~ Dan

Quick Intro: My name is Preston Booth and I am a documentary filmmaker in Starkville, MS (birthplace and home of MFJ Enterprises). In 2024, Martin F. Jue's daughter contacted me to commission a local artist to come and do a small portrait documentary to celebrate Martin's 82nd Birthday. Once I got to meet Martin and the team, I realized that their story really deserved a feature-length production to best tell their story, and I've been moonlighting this project in my free time ever since. I've reached out to the /r/amateurradio mods about this post before making it, as I know that self-promo is frowned upon, but I think I'd regret it if I didn't share this project with hams.



Martin's Wall of Fame

Martin is actually a tremendously fun person to be around. Shortly after sitting for the documentary and doing his interview, he just wanted to stick around and chat about me and my life and what had led me to this point. Next thing I know he was asking me if I wanted to get dinner at some point in the future to chat more about it. It seems like he really loves to get to know people and learn about what makes them tick. From all of the research I've done during this project, I've seen him do the same for many other hams who came to tour the facility. This always sort of struck me as odd because I'm sure his workload was unfathomably taxing at his age, but it seemed like he was always willing to drop what he was doing and spend time with folks who made the trip.



Martin's family. Can you guess which one is Martin?

Martin's childhood explains a lot about MFJ's philosophy. Martin lost his father at the age of 5 and he grew up in the back of a grocery store with as many as 11 kids at one time (siblings and nieces and nephews). He fell in love with radio tech at a young age, but due to their circumstances he had to build everything from scrap parts he got from a repairman (first ham contact) in his town. Martin grew up completely cut off from commercial ham products as a child

and I think it made him hellbent on providing for others what he went without as a child. Randy Romero, Martin's righthand at MFJ disclosed to me that Martin's Philosophy was, "making quality affordable" and it really tracks with my interactions and research with Martin. On the topic of quality, another of Martin's priorities was providing opportunities to folks in the local community. For those who don't know, the deep south can be an absolutely unforgiving environment to live economically speaking. Martin's own experience made providing opportunities for folks to prove themselves through hard work a priority for him. Realistically speaking, at any point in MFJ's 50 plus year history he could have just outsourced manufacturing overseas and dramatically decreased his overhead and increased the quality control standards but for him it seemed to be paramount that he provide jobs locally. I know MFJ's build quality is a passionate topic around here, and I'm not here to argue that. I just thought the backstory behind the philosophy might be interesting to some of you.



Newspaper clipping explaining Martin's science project.

Martin's first big break with technology actually came from a science fair project in the tenth grade. At the age of 14 he built a full radio telemetry station from what others may have considered garbage. The technicals are really fascinating so I will include the quote here:

"... This was back in 1960's when satellites were first put into orbit. And my project was a telemetry system that would demonstrate how a satellite would work.

It would do things in a very simple manner: to measure humidity, I had two nails and it had salt around it, and I would measure the resistance of that. Because that salt would absorb moisture and reduce the resistance.

And the way that I measured the resistance was I built an audio oscillator whose frequency would change with resistance. And the same thing with measuring wind direction and wind velocity. They used volume controls out of the radios and it would just turn and swivel and they would change the resistance. And a transistor with the cap taken off would measure the intensity of light.

But each one of those would cause the frequency of the oscillator to change; so you'd hear a change in pitch. And then there was an electric motor that I got off of a display that was on one of the displays from a store, a tiny little motor that would turn a switch and it would switch each one of these for a certain amount of time.

Then I built a little radio transmitter on a broadcast band that would transmit it to a different receiver, just an ordinary receiver. And then from the tone that you could match by using another oscillator, it would be calibrated. You could make measurements."

He won his school's fair, but it also ended up being the first science fair project the school had entered at the state level and he won that one as well. The grand prize was a trip to Mobile Alabama to ride on a Destroyer and it was actually the very first time he had ever left the state of Mississippi in his life. Of course, I'm blown away by his resourcefulness but it's also really cool to see the defining moment where you can see the wheels turning in his mind that a mastery of technology could really start providing opportunities to better his and his families situation.

Martin's first move after receiving his master's degree at Georgia Tech wasn't to establish MFJ, it was to move home and run the family grocery store business for his brother so his brother could take time off and travel to mainland China. To hear Martin tell it, he says this is where he got his "MGS: Master's in Grocery

Store". From his own words, this is where he learned the fundamentals of business, marketing, and client relations. This one just blows me away because he was so hilariously over qualified to be running a little country grocery store but his priority has always been family and duty.



Martin graduates from Georgia Tech.



Jue Family Grocery, drawn from memory by Martin's nephew.

Martin was drafted for the Vietnam War. This isn't something he ever discussed with me or with the broader public, but I found an excerpt from an old ECHO Zoom QA he did a while back. Apparently shortly after high school he received his draft letter, went through bootcamp and was in his own words, "*happy to serve*" but at the end of the process they told him, "*You can't see, and you can't hear, and we don't want you.*" Just sort of nuts to think about the butterfly effect of Martin going overseas instead of college on all of our lives.

I get the feeling that Martin is deeply a private person, but he is so generous with his time and experience that he says yes to nearly every one who asks that he often finds himself in the spotlight. As a result, he's often asked a lot of similar questions regarding his upbringing and his early experiences with HAM tech. One thing I find really interesting is that when discussing the first project he ever worked on (the fox hole crystal radio he built from the boy scout

handbook) he always is sure to mention that he could not ever get it to work, but that the time he spent trying to make it work is what got him excited about ham tech. He later built a single transistor radio from a kit he saved up to purchase, but when asked about his first project he always is sure to mention the failure. He doesn't seem to measure his experiences by his successes but what he was able to take from each experience.



Martin and the first radio he ever built.

Quick Factoid section:

- MFJ's longest tenured employee was a woman named Phyliss Randle who worked for 45 years at the company before retiring. At one point MFJ was employing three generations of her family which just blows me away. In fact, while getting to know the employees I didn't interact with anyone (not including students and recent grads) who had been there for shorter than 9 years.
- The first Dayton Hamvention that Martin attended while he was teaching at MS State Univ. and he would drive all night Thu/Fri and Sunday after class so he didn't have to buy a hotel room. He said that he'd often be getting back to Starkville on Monday morning just in time to teach his first class. Man was an absolute beast I have no idea how he was able to operate on such little sleep.
- On the topic of MSU, MFJ's first production line was actually comprised of students who built the project for extra credit or personal compensation. Apparently, he didn't stop teaching and pursue MFJ full time until they had over 30 employees, so there were many years where he was working two full time jobs.

- I still don't know what Martin's middle name is. It's sort of funny because it seems like such a non-important detail, but whenever someone else he just says, "*the F stands for fun*" and he's sort of private about it. That being said I have had a lot of fun spending time with him so I can't say it is entirely inaccurate.
- On the subject of the name, he mentioned that he named it MFJ Enterprises because he always wanted it to grow, but that he didn't name it Martin F Jue Enterprises, "just in case the business failed, I didn't want to ruin the family name."

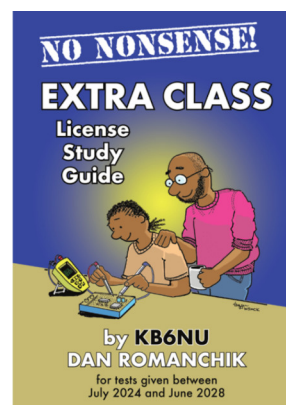
Honestly, I could go on and on. I'm just fascinated by this man and his company and I feel so blessed to be the one to get to tell his story. If anyone is interested in the project or watching the trailer, go to <https://www.prestonboothcinematography.com/mfj-documentary>.

If anyone has any questions, please don't hesitate to ask. I will do my best to answer them all in a timely manner.

I'm also really interested in hearing the community's MFJ stories as well, so if you have anything you'd like to contribute, I'd love to hear about it.

Thank you for letting me be a part of your ham radio community!

~ Dan KB6NU



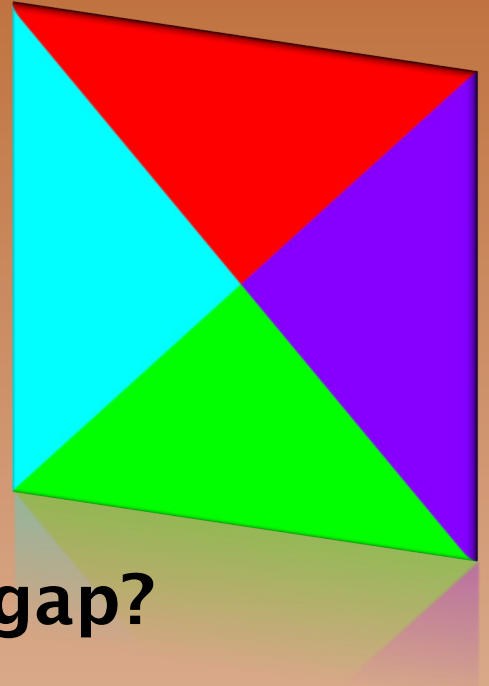
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Foundations of Amateur Radio



Where is the spark... gap?

Back to Grimeton

by ONNO BENSCHOP VK6FLAB



**Onno Benschop
VK6FLAB**

To listen to the podcast, visit the website: <http://podcasts.vk6flab.com/>. You can also use your podcast tool of choice and search for my callsign, VK6FLAB.

Full instructions on how to listen are here: <https://podcasts.vk6flab.com/about/help>

As the last remaining functional Alexanderson alternator transmitter, it was added to the UNESCO World Heritage List in 2004. You can visit and see first hand what radio history looks like. As I said, if you pick your day, you can even watch it working. Failing that, there's plenty of YouTube videos showing the entire process, it's an absolute monster.

There's even an amateur radio shack on-site with the callsign SK6SAQ. The website says that it's open sporadically, so I'd recommend you contact them before heading to Grimeton.

I'll note that at the time that this station was being commissioned in 1924, it was already being superseded by valve oscillators, which brings me to how it works.

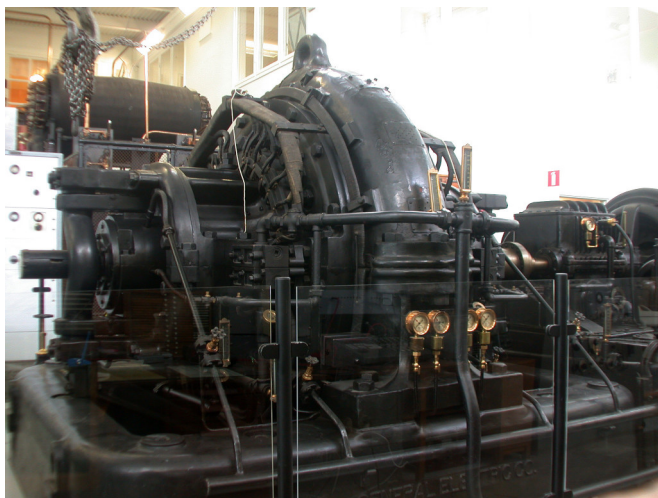
Depending on where you live, you're likely familiar with the 50 or 60 Hz alternating current associated with household electricity. In 1891, Irish experimental physicist Frederick Thomas Trouton pointed out that if you could run an alternator at high enough speed it would create an alternating current at radio frequencies, said differently, creating a continuous wave at radio frequencies. Much experimentation followed and many giant shoulders supported this effort.

It goes a little like this. Use an electric motor designed to spin at 900 revolutions per minute. Connect it to a gearbox. Connect that to a rotor with multiple poles. Then run the motor with a clutch to vary the speed. If that's not enough, to produce high power, the clearances between rotor and stator have to be kept to a millimetre. Then there is cooling and lubrication to consider, not to mention dealing with thermal expansion and contraction of a fast spinning and closely tolerated disk.

At Grimeton, the whole transmitter weighs in at 50 tonnes, pretty much the opposite of portable operation. The rotor at Grimeton is a 1.6 meter diameter disc with a 7.5 cm thick edge with 488 slots milled into it, each filled with brass. The motor at Grimeton runs at just over 711.3 revolutions per minute, the gearbox has a ratio of 2.973 and the whole contraption generates 17, 200 Hz.

If you get the sense that you're balancing an elephant on top of a needle, you're almost there, but if you consider that keying the transmitter changes the load and currents, it's more like an elephant being shoved by a train, balancing on top of a needle.

At Grimeton, the motor is loaded by one of three liquid resistors, which each consist of a two metre high container filled with water and baking soda. The liquid level is controlled by



Alexanderson alternator in the Grimeton VLF transmitter. The drive motor is at the extreme right; the speed-increaser gearbox is just to its left. Note the bronze-colored shaft coupling.

separate pumps, varying the resistance. Whilst transmitting, a second liquid resistor is added, reducing the resistance to regulate the speed of the motor to maintain the overall speed and the associated frequency. The resistors generate heat which is fed through a heat exchange to the station's water cooling system. The third resistor is available as a spare.

The remarkable thing?

It works.

So much so, that there were several stations built and operated across the planet.

There's more

This system is also capable of Amplitude Modulation, and with it, the ability to send the human voice across the airwaves. As an aside, there is a rotating spark-gap transmitter by Canadian electrical engineer and inventor Reginald Fessenden who is said to have given voice to radio in 1900 across a 1.6 km distance, but that's a tale for another day.

The frequency that Grimeton transmits on, 17.2 kHz, means a wavelength of nearly 17.5 km. The antenna at Grimeton is "only" about 2 km long, in other words it's a compromise antenna. I'm

All podcast transcripts are collated and edited in an annual volume which you can find by searching for my callsign on your local Amazon store, or visit my author page: <http://amazon.com/author/owh>. Volume 7 is out now.

Feel free to get in touch directly via email: cq@vk6flab.com, follow on twitter: [@vk6flab](https://twitter.com/vk6flab) or check the website for more: <http://vk6flab.com/>

If you'd like to join a weekly net for new and returning amateurs, check out the details at <http://ftroop.vk6flab.com/>, the net runs every week on Saturday, from 00:00 to 01:00 UTC on Echolink, IRLP, AllStar Link, IRN and 2m/70cm FM via various repeaters.

If you'd like to participate in discussion about the podcast or about amateur radio, you can visit the Facebook group: <https://www.facebook.com/groups/foundations.itmaze>

This podcast episode was produced by Onno (VK6FLAB). You can find more at <http://vk6flab.com/>

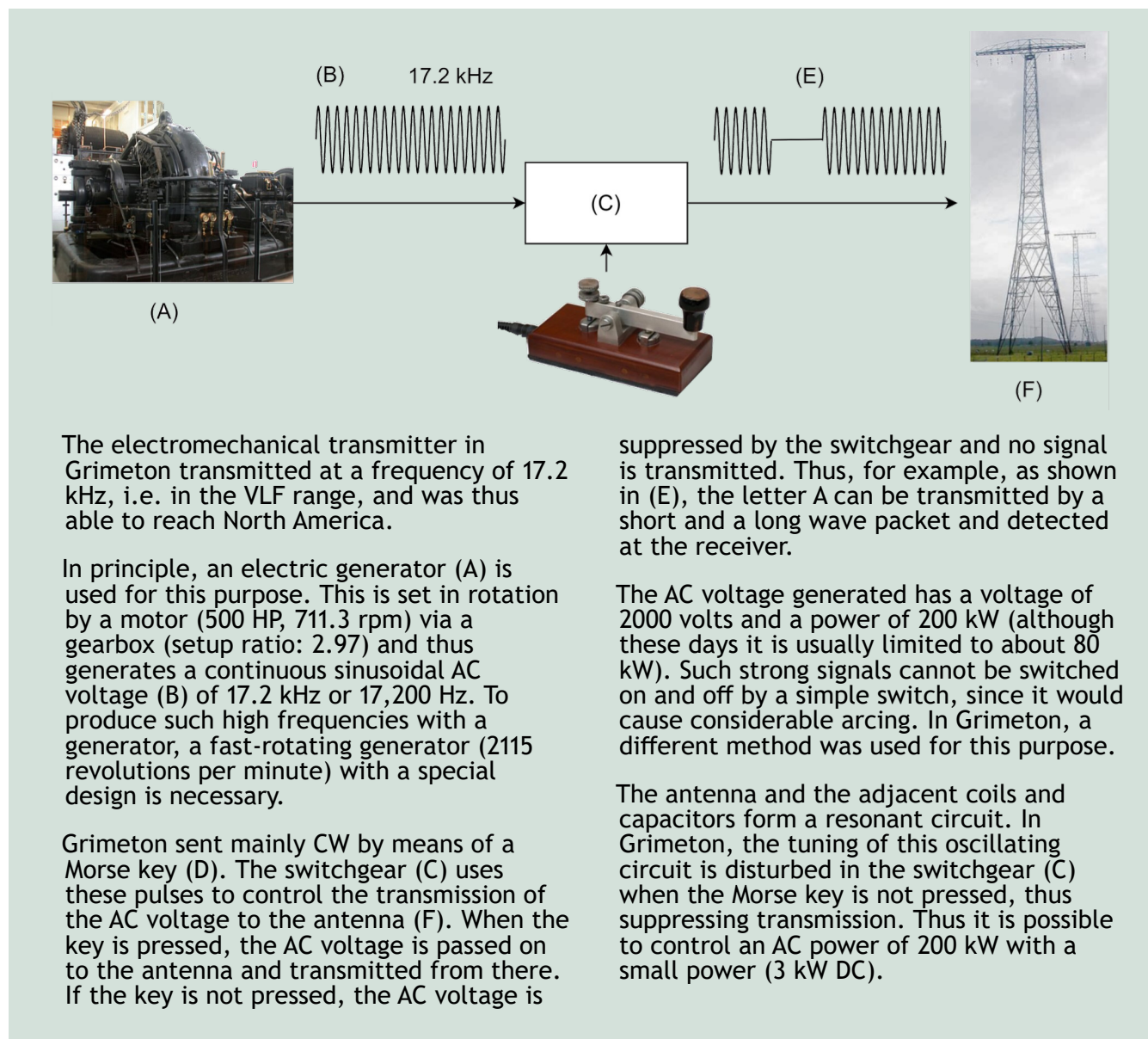
making a joke here, but also a point, every antenna is a compromise. Any antenna is better than no antenna.

Meanwhile, the antenna at Grimeton looks like a string of high voltage pylons with eight wires strung between them. Each of the six towers is 127 meters tall, with a cross arm that's 46 metres wide. Every tower holds a vertical radiator, connected to the ground via a coil to tune the phase and capacitance of each radiator.

So, spark gap this is not, well at least not intentionally. This remarkable piece of engineering makes me wonder if you can use the same system to spin a modern motor, say the spindle of a CNC, and use it to get on air and make noise.

Now all I need is someone to talk to.

~ I'm Onno VK6FLAB



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- Practice an exciting hobby or start a career opportunity



Back to Basics

From The Canadian Basic Question Bank

Understanding the Sound Card Interface

The revised July 2025 Canadian Amateur Radio Question Bank includes new questions addressing computer-based digital modes. Two examples are shown below:

B-003-007-001

Which of the following is a function of the sound card interface in a station operating computer-based digital modes?

- A. To amplify the digital signals to be sent by the transceiver
- B. To demodulate the transmitted signal
- C. To convert the received analog audio signal from the transceiver into a digital signal for the computer
- D. To convert the received digital signal from the transceiver into an analog signal for the computer

B-003-007-002

Which of the following is a function of the sound card interface in a station operating computer-based digital modes?

- A. To convert the analog signal from the computer into a digital signal that can be transmitted
- B. To amplify the digital signals to be sent by the transceiver
- C. To demodulate the transmitted signal
- D. To convert the digital signal from the computer into an audio signal that can be transmitted



John Schouten VE7TI has been teaching amateur radio courses for over 25 years, and is the Course Coordinator for Surrey Amateur Radio Communications

Role of the Sound Card Interface

In a modern amateur radio station, the sound card interface acts as the audio bridge between a personal computer and a transceiver. It enables reliable operation of computer-based digital modes by allowing audio signals to flow in both directions.

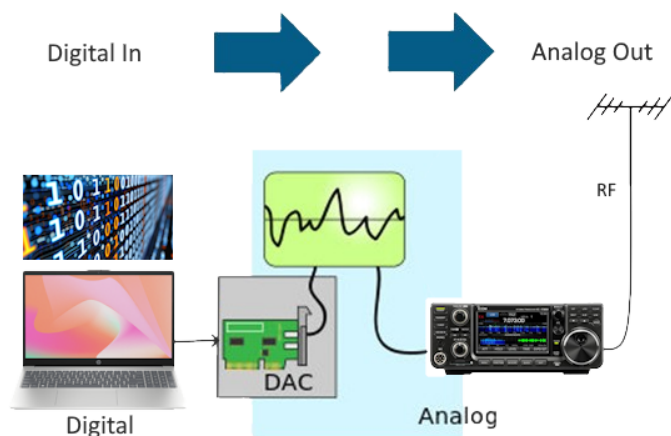
The interface is typically a standalone USB device, although some transceivers, such as late-model iCOMs include an internal sound card. Most interfaces incorporate galvanic isolation using audio transformers and optocouplers. This isolation prevents ground loops, hum, and radio-frequency interference that can degrade weak digital signals. The interface also ensures proper audio level matching between the computer's line-level audio and the transceiver's microphone or data-port input, reducing distortion and preventing over-deviation during transmission.



The [Signalink](#) is one popular brand of Analog-Digital/Digital-Analog interface configurable for a wide variety of transceiver makes and models.

Analog-to-Digital and Digital-to-Analog Conversion

At the core of the sound card interface are analog-to-digital (ADC) and digital-to-analog (DAC) conversion processes. These conversions make it possible for computers and radios to exchange information using audio tones. Receive and transmit just reverses the process.



Transmit Signal Path

On transmit, digital-mode software running on the computer processes information such as call signs, grid squares, or message text. This data exists in digital form within the computer. The computer's sound card DAC converts the digital data into a continuous analog audio waveform by sampling the data at a fixed rate, typically 48 kHz or higher.

The resulting audio tones—generated using techniques such as audio frequency shift keying (AFSK) or multi-tone modulation—are sent through the sound card interface to the transceiver's audio input. The transceiver then modulates these tones onto a radio-frequency carrier for transmission.

Exam relevance:

This process directly supports Question B-003-007-002, where the correct answer (D) is that the sound card interface converts the computer's digital signal into audio suitable for transmission.

Receive Signal Path

On receive, incoming radio-frequency signals are demodulated by the transceiver into analog audio tones. These tones appear at the radio's speaker, headphone output, or dedicated data port. The analog audio is routed through the sound card interface and into the computer's sound card input.

The sound card ADC samples the incoming waveform and converts it into a digital audio stream. This digital data is then processed by the software, which analyzes frequency, timing, and phase to recover the original information.

Accurate conversion depends on factors such as sampling rate, in accordance with the Nyquist theorem, and bit depth, commonly 16 or 24 bits. Higher-quality interfaces minimize noise and distortion, which is critical because many digital modes operate at very low signal-to-noise ratios.

Exam relevance:

This receive-side function corresponds directly to Question B-003-007-001, where the correct answer (C) is that the interface converts received analog audio into digital data for the computer.

Practical Applications in Amateur Radio

One of the most common uses of the sound card interface is FT8 operation with WSJT-X software. FT8 uses a tightly structured, time-synchronised protocol with 15-second transmission intervals on HF and VHF bands. The software generates precise digital tone sequences that the DAC converts into clean analog audio. Received signals follow the reverse path, allowing reliable decoding even when signals are well below the noise floor. Proper audio-level adjustment is essential to avoid clipping or distortion that could impair decoding.

Another important application is Winlink, a global radio-based email and messaging system used for emergency communications, maritime mobile operation, and remote connectivity. Winlink employs sound-card modes such as VARA HF and ARDOP, which use advanced waveforms, including orthogonal frequency-division multiplexing (OFDM). In these systems, the interface's DAC produces high-fidelity transmit audio, while the ADC captures received signals with sufficient resolution for error-corrected data transfer.

Across a wide range of digital modes—including PSK31, Olivia, JS8Call, and MFSK—the sound card interface provides a reliable, low-cost, and flexible solution that works with nearly any transceiver. Its isolation features and stable audio conversion make it well suited to portable operation, contesting, and emergency communications.

The sound card interface is a fundamental component of computer-based amateur radio digital modes. By converting digital data into analog audio for transmission, and analog audio back into digital data on receive, it enables modern software-defined communication techniques using conventional radios. Understanding these basic functions is essential not only for effective station operation, but also for correctly answering Canadian Amateur Radio examination questions related to digital modes.

~ John VE7TI

Be Kind - Send good code

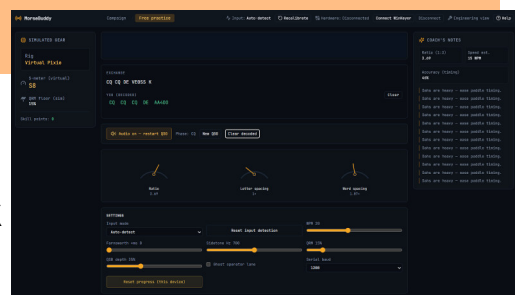
Richard AA400's "**Training for Sending Code — on the Web**" describes a free web-based Morse-code coach the author created to help operators improve their sending (not just receiving) and make practice engaging by tracking progress.

Motivated by hearing many otherwise knowledgeable hams send poorly-timed or inconsistent code, the author built a tool called "Morse Buddy" (aka "Be Kind — Send Good Code") that decodes users' keyed input and gives immediate, actionable feedback on character correctness, inter-character and word spacing, overall timing accuracy, and straight-key DIT/DAH ratios. The app supports both straight-key and paddle-style keying via the keyboard (space bar for straight key; [and] for iambic paddle emulation), with plans to add native paddle/dongle support (Winkeyer/USB) to reduce keyboard latency. A QSO simulator alternates turns with the user: the app sends a line ending

with K or BK, then the user replies; sending K (or BK) returns the turn.

The decode window shows what the app interpreted from the user's keying and gauges helpfully labeled under the decode area display timing and ratio stats; progress, badges, and virtual rig unlocks are stored per-browser and can be reset. The author emphasizes the app's focus on sending legible code to avoid cluttering the bands and invites constructive feedback, feature requests, and bug reports. The piece closes by urging operators to "clean up your sending" and notes the project is a work in progress and freely available.

~ The article is at <https://www.hamradiogrp.com/2026/03/training-for-sending-code-on-web.html>





No-ham Recipes

OK... its sorta ham in this one

Spam fritters with spring onion mash

by ELLA TUGWELL GØFIP

Monty Python may poke fun at SPAM, but many who grew up eating it, loved it. In 1940, Hormel, the manufacturer of SPAM, held a contest to name their new product; a man named Ken submitted the winning name, SPAM. But what the word SPAM means is anyone's guess; that it is a combination of the words, SPiced and hAM is a myth. SPAM is a canned mixture consisting mainly of cooked ham, pork, sugar and starch, has been made since 1941, and was and is sold in many countries. Hormel says ham is from the rear upper quarter of a pig, and the pork they use is from the upper shoulder of a pig. Sheesh! And I thought ham and pork were the same thing. SPAM was a common staple in several countries' armed forces during World War II. And that's your dose of the other "ham" trivia for today! Ella shares this recipe, which was originally written in the BYLARA newsletter, author unknown.

The fried SPAM is served with a spring onion mash. For those who have never heard the term, spring onion mash is essentially peeled, cooked potatoes mashed with milk and butter, and then green onions, salt and pepper are added. Comfort food. Yum. The SPAM recipe serves 4.

- 12 ounce 340g) can SPAM
- Vegetable oil for frying or deep-frying
- Spring onions (scallions), finely chopped Chopped herbs, to garnish

The Batter:

- 1 cup (125 g) all-purpose flour
- Pinch of salt
- 1 large egg
- ½ cup (125 ml) milk, or milk and water, or water or beer



Preheat deep fryer to 340F (170C) or heat frying pan or wok

Heat 2 to 3 tablespoons (30 to 45 ml) oil in a frying pan or wok or heat a depth of oil in a deep-fryer to 340F (170C) or until a cube of day-old bread turns golden in a minute.

In a bowl, mix all the batter ingredients. The mixture should be thick, in the proportions given above, in order to coat the Spam well.

Cut the Spam into 8 slices. Coat Spam slices once or twice with the batter, then drop them into the hot oil. If shallow-frying, allow 2 to 3 minutes on each side. If deep-frying, allow a total cooking time of 3 to 4 minutes, turning over the fritters as required. Drain the fritters on kitchen paper, garnish them with fresh herbs & serve with spring onion mash.



May 2026

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
	Event details: SARC—SEPAR 'Live' calendar link All contest information: WA7BNM Contest Calendar: Home					Coffee: 0700 Denny's King George Blvd. & 68 Avenue OTC Open 0930
3	4	5	6	7	8	9
Maple Ridge Swap Meet		1930 SEPAR Net 2000 SARC Net				Coffee: 0700 OTC Open 0930
10	11	12	13	14	15	16
Mother's Day		1930 SEPAR Net 2000 SARC Net	SARC General Zoom Meeting 1900-2100			Coffee: 0700 FoxHunt: 0900 Crescent Park
17	18	19	20	21	22	23
	Victoria Day	1930 SEPAR Net 2000 SARC Net	SARC Directors Meeting 1900-2100			Coffee: 0700 OTC Open 0930
24/3124:	25	26	27	28	29	30
24: 1844 - Morse telegraphs, "What hath God wrought?" from Wash. to Baltimore 31: CQ WW WPX Contest (CW)		1903: Fessenden granted patent for the liquid barretter microphone				Coffee: 0700 OTC Open 0930 CQ WW WPX Contest (CW)



June 2026

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
		1896: Marconi files full specs for first wireless patent			.	Coffee: 0700 Denny's King George Blvd. & 68 Avenue
7	8	9	10	11	12	13
		1930 SEPAR Net 2000 SARC Net	SARC Annual General Meeting 1900-2100			Coffee: 0700 OTC Open 0930
14	15	16	17	18	19	20
		930 SEPAR Net 2000 SARC Net 1934: Armstrong transmits FM signal 70 miles from Empire State Building to Long Island			1934: Communications Act of 1934 creates Federal Communications Commission	Coffee: 0700 OTC Open 0930
21	22	23	24	25	26	27
		930 SEPAR Net 2000 SARC Net 1891: Tesla granted patent 454,622: coupled tuned circuit radio-frequency oscillator	SARC Directors Meeting 1900-2100 1910: Public Law 262, titled "Act to require apparatus and operators for radio communication on ocean steamers"		Field Day Set-up	Coffee: 0700 Field Day 1100 (24-hours)
28	29	30				
Field Day & Take-down	1904: Edison receives patent for alkaline battery		Event details: SARC-SEPAR 'Live' calendar link All contest information: WA7BNM Contest Calendar: Home			

Radio-Active

Profiles of SARC members

Shawn Dooley VE7BD

presented by BLAKE R. WIGGS VA7BWG



As a youngster I always had a fascination with electronics and 2-way radio. I remember building stuff with a Radio Shack 150-in-1 electronic project kit. I built a small crystal radio and could not believe hearing AM radio signals coming in when I hooked it up to a metal pipe under the bathroom sink.

In 1977 while delivering Vancouver Sun newspapers, I had a customer who was talking on HF to someone in California. I could not believe what I heard—I was hooked!

I first started in the 11 meter (CB radio / unlicensed 25-28 MHz) craze of the late 70's. Then, in 1980, I got a part-time job after school working at Armaco Electronics, which was the main supplier for Yaesu radio gear for Canada. I got to test new radios when they arrived from Japan before being sold.



I joined the Burnaby radio club in the mid 1980's and tried to get my Ham license but did not do well on the then-mandatory CW part, so my first attempt failed.

However, I then went to college for two years and studied electronics. After graduating I learned that CW proficiency was no longer required, so I took the test right away and received my Ham ticket...Yay!

However, as time went on I started a family in 2000 and bought a house, so amateur radio took a backseat and I did not do much with it for years, but once my daughters were teenagers I slowly got back into it.

My working background was always to be a tech and repair things etc., but when I finished college I was doing pretty well in sales at the time and stayed that way for the rest of my career. In 2005 I left my management position at a company and started my own rep agency business selling electrical products to wholesalers and end users of OEM's (original equipment manufactures).

After selling my Delta home 5 years ago, I had to reduce from my seven antennas to just two in our new home in South Surrey, so I mainly stick to VHF / UHF, digital modes and 220 MHz.

As member of the Surrey club, I enjoy interacting with club members, the meetings and the breakfast get togethers on Saturday as well and helping to volunteering at special events. Other than ham radio, my other hobbies



are mountain biking and model railroading. I'm just in the midst of building a large layout in my downstairs rec room.

I encourage amateur radio hobbyists to attend Ham events around North America. One of my favorites is "Hamvention" in Dayton, Ohio. I have been twice.

Sea-Pac in Seaside Oregon is a smaller but fun event—I took the YL and finally last year I went to "HamCation" in Orlando, Florida, which is almost as large as the Dayton hamfest.

My advice to new hams is to take it slow, enjoy, meet people and don't be afraid to ask for advice from other Ham operators.

~ Blake VA7BWG

March
2026



SARC General Meeting minutes

March 11, 2026

Recording Secretary MIKE PORISKY VE7YEG

Attendance: 30 members/guests attended online

Start Time: 19:00 hrs

Location: Online via Zoom

Welcome & Presentation of Agenda - Steve called the meeting to order and gave a brief welcome message.

Guest Presentation

The meeting featured a presentation by Rudi Wiedemann K7RAW. Rudi described drone scans to measure antenna performance, comparing EZNEC models with real-world measurements. He demonstrated that measurements can be taken from a drone, providing elevation and azimuth plots with relative measurements rather than absolute values and then explained how to interpret DroneScan data by normalizing readings and plotting them against EZNEC polar plots, emphasizing the importance of clear line of sight and proper flight strategies.

Rudi explained that his DroneScan hardware measures relative signal strength from DC to 440MHz by attaching to a drone and taking readings while flying in a circular pattern. He

explained how the system works by first measuring background noise and then capturing signal strength data, with the companion AutoCare unit controlling a transmitter to take measurements.

Welcome & Call to Order: Following the above presentation, the business meeting was called to order on March 11, 2026 at 19:56 by President Steve McLean.

Steve displayed the agenda and made several announcements.

- The next monthly meeting (Apr 8) will take place in person at the Surrey Fire Training Center.
- An email will be sent out in a few weeks reminding all to renew your SARC membership --which will be required to vote at the annual meeting.
- Many members meet for breakfast at Denny's (6850 King George Blvd) every Saturday morning.
- The next HAM class will start April 6. If you know of anyone who might be interested, have them contact John Brodie.



- Next Saturday, 2 high school students will present their class Capstone project at the OTC starting at 10 am. They will be demonstrating the transmission of light modulated by sound.
- The OTC will not be available for socializing on the last weekend of March (29th) but will still be open for those participating in the contest.
- Scouts Canada is looking for volunteers to demonstrate Ham radios during their summer event at Camp McLean. If anyone is interested, contact Barb Taylor for dates and more information.
- SARC's annual foxhunt will take place on May 16. Anyone planning to attend should send an email to Anton so that he can purchase the correct quantity for lunch. The cost will be \$10 for adults and free for kids.
- Ken Clark is looking for volunteers to help at this year's Hyack parade. If you can help, send an email to Ken at VE7BC@gmail.com.

QUESTIONS: Ward asked what was involved with helping at Camp McLean. John and Stan explained some of the tasks that were done in prior years. Ward said that he would be available to assist if he could get some help.

Committee Reports:

1. Financial Report – Scott H.

- The GIC that was invested last year came due at the end of last month and was re-invested for 1-year at 2.8% interest.
- Scott explained that recent large expenses (bigfoot repair and antenna purchase) are the reason for the lower balance.
- The current and previous month's Balance Sheet and P&L statement were displayed for all members to review.

2. Nets – Reg N.

Andrew (VA7LGN) will be taking some time off from the SEPAR net and is looking for someone to take over. Let Reg know if you're interested.

3. SEPAR/OTC

- A Winlink exercise is scheduled for March 19-30 to simulate a tsunami disaster. This will involve sending 2-3 forms by email using WinLink. Horace will send out reminders

with instructions before the event starts or watch for more information in the next bi-weekly bulletin.

- This past year, Gord and Steve have been in discussions with the city regarding the operation of the OTC building. There are parts of the contract that they were not comfortable signing. A recent meeting with the Surrey fire department, (which oversees the SEPAR program) was held to discuss options. They proposed putting the OTC building under the Fire Department control and we are still waiting to hear back. There is more work to do but progress is being made.
- Stan mentioned that there was a leaking area of the roof. Steve said that it was caused by a buildup of leaves blocking the drains. Once the leaves were removed, the water drained and the leak stopped.
- Gord thanked all SARC members who are involved with SEPAR, recognizing that the reason we have access to many benefits is our involvement with the Surrey Emergency Program. He encouraged anyone interested in joining to see him for an application form as more members are always welcome.

4. Membership – John B.

- Current membership is 156. New members continue to join at a rate of about 2 per month.
- John will be calling for renewals in mid April. Reminder that you must be in good standing to vote.

5. Contests – Mike P.

- Mike recapped the 3 contests that took place since the last meeting and announced the 2 contest that are coming up within the next few weeks. If you are interested in joining the contesting team, contact Mike at contesting@ve7sar.net

Past:

- CQ WW WPX Contest (RTTY): Slawa was the sole operator
- ARRL International DX Contest (CW) Feb 21-22: good propagation with a full list of operators
- ARRL International DX Contest (SSB) March 7-8: good propagation and lots of contacts



Coming up:

- Commonwealth Contest (CW) March 14-15
- CQ WW WPX Contest (SSB) March 28-29

6. Repeaters – Horace

The 220 repeater was down for a few hours, just needing a reboot to get things running normally again.

7. Basic Class – John S.

- The current class is coming to an end with just 1 session remaining. The review session will take place the following Monday and students will have their first chance to write on Tuesday. Hopefully several more will write on the following Saturday.
- 61 started the course and 45 students are still attending.
- The next ham class is scheduled to start April 6.

Old Business

- Big-foot tower repairs. While this task took longer than expected, the vendor did a great job. They found a second issue with one of the pulleys but ordered the part and fixed it without additional charge. The trailer was picked up this week and taken back to its storage spot.
- Repeater cleanup. The AGM UPS battery was replaced and cabling in the back of the rack was cleaned up. The two laptop computers at the repeater site are quite old and will need to be upgraded soon.

- The Hi-Q antenna has been repaired and we are waiting for warm weather to re-install it.
- Dino's clock project will take place this weekend starting at 12 pm. The cost is \$30 (excluding the case).
- Scott Thomas (VE7KAT) approached the Spectrum Flying Club and received permission for SARC to set up Field Day operations on their site. Steve displayed a map of the area and listed the amenities that were available at the flying club. We are looking for volunteers to help organize and set up. More information will come during the May and June meetings.

New Business

- Cristian wanted to add his name to the clock project and will make a payment tonight.
- Shawn reminded everyone that Denny's now does not open their doors until 7 am.
- Steve requested any new business from members; nothing added.

Adjournment:

Steve moved to adjourn the meeting at 20:42.
Seconded by Andrew E. Carried.

~ Minutes taken by Mike Porisky VE7YEG

Spy Tech: Conflicts Bring A New Number Station

If you know much about radios and espionage, you've probably encountered number stations. These are mysterious stations that read out groups of numbers or otherwise encoded messages to... well... someone.

<https://hackaday.com/2026/03/30/spy-tech-conflicts-bring-a-new-number-station/>

April
2026



SARC General Meeting minutes

April 8, 2026

Recording Secretary MIKE PORISKY VE7YEG

Attendance: 27members/guests

Start Time: 19:00 hrs.

Location: Surrey Fire Training Centre

Welcome & Presentation of Agenda - Steve called the meeting to order and gave a brief welcome message.

Guest Presentation

Featured presenters for tonight's meeting were SARC member, regular Communicator contributor and author, Steve Stroh N8GNJ and Tina KD7WSF. Steve is the Editor of the Zero Retries newsletter (www.zeroretries.org) which promotes technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. When not writing Zero Retries, Steve experiments with Amateur Radio data radio systems in N8GNJ Labs (his shop) in Bellingham, WA,

Steve discussed a wide range of technological innovations in Amateur Radio and explained the term he coined "New Tech Hams".

Welcome & Call to Order: Following the above presentation, the business meeting for April was called to order at 20:20 by President Steve McLean.

Steve presented the agenda and made the following announcements:

- A reminder that members should receive a bulletin of current affairs every 2 weeks. If you are not yet on the list, and want to be, send an email to brodiejb@shaw.ca.
- The next Ham class originally scheduled to start April 6 has been delayed due to a low enrolment. It will be postponed until the last week in April.
- The Maple Ridge swap meet will take place on Sunday, May 3. SARC will purchase 2 tables. Any members with items that they would like to sell at the swap meet, can contact John B.
- The SARC annual fox hunt event is scheduled for Saturday, May 16. If you plan on attending, please notify Anton. Cost for the BBQ will be \$10 (free for kids).



- Ken Clark is looking for volunteers to help at this year's Hyack parade. If you are available to help, contact Ken at VE7BC@gmail.com.

Committee Reports:

1. Financial Report - Scott H.

- P&L and Balance sheet (previous month and current) were displayed for review.
- The chequing expense of \$7500 was for the purchase of the new beam antenna. The \$800 income was from the NTP clock project which will be offset by an equal amount in expenses.
- A 1-year GIC has been purchased.
- Scott reported that Penny is feeling better and will be able to do the year-end report.

2. Nets

Reg is away this week so information about SARC nets was not available.

3. SEPAR/OTC

- Gord and Steve met with the Fire Chief last month and have not yet received any updates.
- The Surrey Emergency Preparedness event will take place on May 5 at city hall. Gord is looking for several volunteers that could help set up and participate in the 4-hour demonstration.
- The OTC will not be available for socializing on the last Saturday this month (April 25) due to SFSAR training.

4. Membership - John B.

- Current membership is 158 - continuing to grow at 2-3 per month.
- Annual memberships will be coming due in a few weeks. Watch for the notice in the weekly bulletin. Membership renewal can be made by e-transfer to payments@ve7sar.net

5. Contests - Mike P.

- Mike reviewed the 3 contests that were completed in March and shared the results of the BC QSO Party in which SARC placed 4th in BC.
- The Rookie roundup contest, coming up next week, is for new ham operators. If any new

hams would like to try out operating in a contest setting, coaching will be available. Contact Mike at contesting@ve7sar.net

- Notices about upcoming contests will be sent out approximately 10 days prior.

Completed 3 contests

- March 7-8 ARRL International DX Contest (SSB), 8 operators, 1137 contacts
- March 14-15 Commonwealth Contest (CW), 6 operators, 98 Contacts
- March 28-29 CQ WW WPX Contest (SSB), 8 operators, 511 contacts

Next Contest

- ARRL Rookie Roundup, SSB April 19 (8 hours)
- CQ WW WPX DX, CW (30-31 May)
- Field Day June 27-28

6. Basic Class - John S.

- The previous class is now finished. 10 students have written so far with 1 student achieving 100%. Others will write the exam at the OTC on Saturday mornings for the next 1-2 weeks.
- The high school class is halfway through the semester. The subject of transmitters and receivers is covered next week.
- John estimates that a majority of the high school students will pass the Basic ham course.
- Several students who took part in 2024's RF summer course have now gone into engineering programs.
- The next Basic course is scheduled to start on April 27, if enough candidates sign up.

Old Business

1. AREDN

- Doug (VA7JDJ) gave a PowerPoint presentation to the membership with an update and review of the AREDN installation.
- He explained what AREDN is, where it is used, advantages over other technologies, including low cost. Another advantage is the access to off-the-shelf hardware, making it easy to expand its reach and upgrade the existing components.



- New technologies are being added to the AREDN framework, such as IP400 and Meshcore.
- AREDN capabilities include chat, video streaming, email, VOPI, and file sharing.
- The node at the concord repeater site has been up for over a year. It has received modifications and recent tweaks, but it is still not working 100%. Sector antennas will be installed soon, giving those with LOS to the building an opportunity to connect.
- Steve Stroh suggested Homelab(?) students. At this time all network traffic is local.

2. Mike (VE7YEG)

- Mike presented plans for Field Day which will take place on June 27-28.
- The proposed location this year is Spectrum Flyers Field located at approximately 48 Ave and Hwy 15.
- Lunch will be provided Saturday afternoon for volunteers. Also planned are a couple of demonstrations.
- We will soon be looking for assistance with the following activities:

- 5-10 members to help set up the big-foot antenna on Friday (June 26),
- 2-3 volunteers to plan and deliver the Saturday lunch,
- 1 trailer-towing truck to bring out the SEPAR Trailer Saturday morning
- a short session on “Lessons Learned this Year” (or any other topic),
- Coordinator to organize this year’s children’s activity
- Help taking down the Big-foot antenna on Sunday afternoon.

New Business

Due to the shortness of time, all new business was deferred to the next meeting.

Adjournment

Steve moved to adjourn the April board meeting at 21:05. Seconded by Andrew E. Carried.

~ Minutes taken by Mike Porisky VE7YEG

My Presentation at SARC

Tina and I very much enjoyed our brief trip to Surrey (Vancouver) British Columbia, Canada for me to give a presentation at Surrey Amateur Radio Communications Society.

Given the activity level of SARC and especially SARC’s worldwide outreach via its stellar newsletterzine The Communicator, as I was developing the presentation, the majority of the presentation morphed into the most comprehensive explanation I’ve done to date of NewTechHams. I plan to clean up and post that portion of the presentation, and expand it into the long promised detailed page on NewTechHams.

But one of the biggest draws of attending SARC’s first in-person meeting of 2026 was meeting John Schouten VE7TI, Editor of The Communicator:

I’m in awe of the stellar job VE7TI does in producing The Communicator and I gave him a number of appropriate kudos during my presentation.

Appropriate because in being free for anyone to access, with great content that represents Amateur Radio very well, The Communicator is a significant resource in attracting and educating NewTechHams and potential NewTechHams.

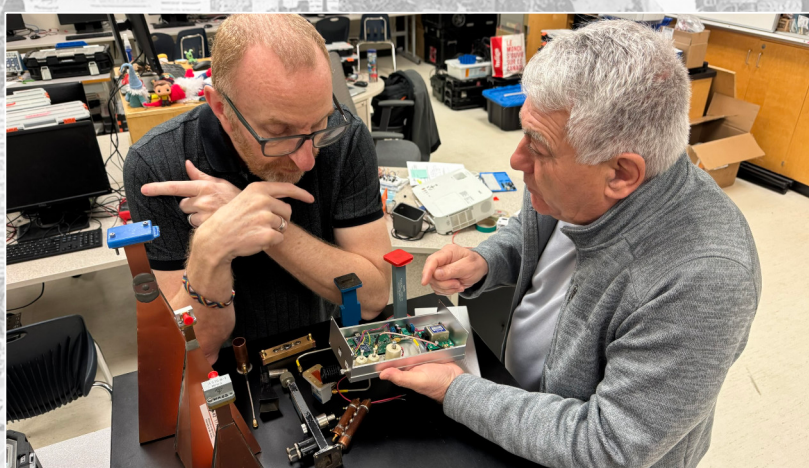
And yes, boss 😊, I’m mindful that “deadline approacheth” for the next issue of The Communicator, and I’ll get my column in on time.

~ [Zero Retries 0246](#)

*John Schouten VE7TI
and Steve Stroh N8GNJ
photo by Steve Stroh
N8GNJ*



Recent Photos

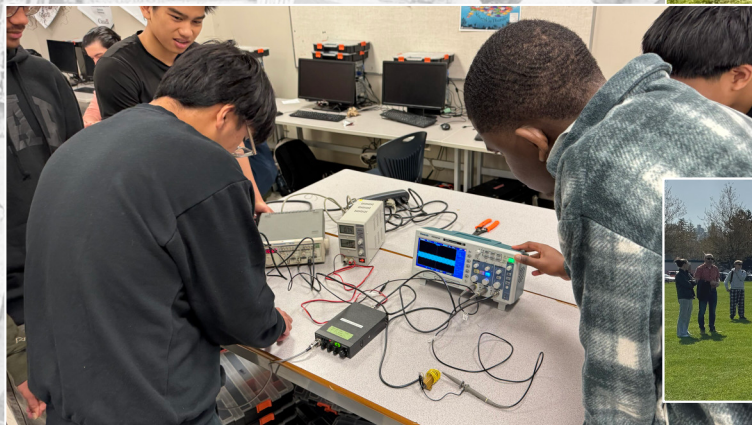


Top: Dino VE7NX demonstrates his home-built microwave gear to teacher Adam Drake VE7ZAL.

Left: Kwantlen Park High School RF Communications student Asari takes the mic to transmit a microwave signal using the North Shore mountains as a reflector to a second station.

Below: Studying Amplitude Modulation using a CB transceiver, audio signal generator and a mic with an oscilloscope.

Below right: Pico balloon launch [see page 63].



Scenes from the RF Communications semester course at Kwantlen Secondary School in Surrey - SARC members providing demonstrations of the various aspects of Amateur Radio



Thank you recent visitors... 166 countries and counting—more than in my log!

	33,628		248		72		20		8		3		2		1
	21,857		217		72		17		7		3		2		1
	13,529		208		70		15		6		3		2		1
	3,738		190		70		14		6		3		2		1
	2,341		189		64		13		6		3		2		1
	2,005		188		48		13		6		3		2		1
	931		188		48		12		5		3		2		1
	903		181		46		12		5		3		2		1
	739		180		45		12		5		3		2		1
	733		176		43		11		5		3		2		1
	705		176		39		11		4		3		1		1
	587		174		34		11		4		2		1		1
	544		141		33		11		4		2		1		1
	452		115		31		11		4		2		1		1
	439		114		30		10		4		2		1		1
	375		106		30		10		4		2		1		1
	370		100		28		10		4		2		1		1
	351		93		28		10		4		2		1		1
	327		88		27		9		4		2		1		1
	307		82		20		9		4		2		1		1
	306		81		20		8		4		2		1		1

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We welcome your comments and feedback

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New Handheld Transceiver Options

Many have Winlink, APRS and digital capability

by GORD KIRK VA7GK



Gord Kirk VA7GK
is a SARC Director
and the City of Surrey
SEPAR Coordinator

SEPAR interest and membership remains strong and active. Each week our net, Saturday breakfast and OTC (operations and training center) are well attended. Discussions range from project builds to some working on Meshtastic nodes, AREDN mesh networking, and others bring in new radios to program.

Several of our team have purchased new VHF/UHF handheld radios, the B-TECH UV Pro (or the VGC variant), and we have been learning how to program them, how the app works, and playing with APRS. We have also been using the KISS TNC in the radios to work with apps on our phones to send WINLINK messages. The android WINLINK app is WOAD and the iPhone app is Radio Mail. Both work very well and allow with the radio to wireless pair via Bluetooth the devices together and then create the email in the app and send it out. There is no CAT control so the radio does require the correct frequency to be tuned prior to the sending the message. There are some steps to help the Bluetooth connect each time, at least on apple devices. The simplest way to describe it is to close the apps, go the iPhone Bluetooth and “forget the device” in the Bluetooth list. Then turn on pairing in the radio menu, open the app and it will ask you to pair. This trick can help eliminate a lot of frustration with the radio connecting as you want.

These new radios are also IP67 rated and USB-C charging. They make a great everyday radio and often is the one I grab every time I go out. This convenience of simply bringing a single handheld radio in addition to my phone really helps me to ensure I can connect when needed. Several of our team do have small radio go kits which also include HF capability, roll up antennas etc. But the simple handheld radio/phone makes a great combo when “just running out”.



Another item in the kits are now readily available battery banks that can rapidly charge a laptop, cell phone and power a radio. There are now “trigger” cables available that can take the output from the USB-C cable and step it up to 9, 12, 15 or 20 volts. This again helps reduce the number of cables to charge multiple devices. With a bit of thought you can make a very powerful radio kit in a very light weight package. Take some time to ask around, watch a few YouTube videos and you may be very pleasantly surprised how easy it is to be prepared to communicate.

My last thought I want to share this month is to practice regularly. Take time to connect your radio to the computer and actual send a message. Make sure things work and you are familiar with each part of your kit’s operation. It is often said “in an emergency you do not rise to the occasion but fall to your level of training”. Myself I recently plugged in my laptop to my radio to send a WIINLINK message and it failed. I do use the equipment on a regular basis but something changed. Maybe during one of the “required system upgrades”?

It ended up that the COM port and sound settings needed to be reset to work. Yes, a bit of fuss to get it working again but at least it was not during an actual need to operate, just a practice session. Also make sure your radio is programmed and you know how to use it. Try checking into a net. SEPAR has our frequencies on the website along with all of our net times, frequencies etc. You are always welcome to check into a net.

We are moving rapidly towards the annual field day event in June, maybe now is the time to get out your gear and start setting things up and testing everything.

As always if you want more information on SEPAR please reach out. Our website www.ve7sar.net.

~ Gord Kirk, VA7GK
Volunteer SEPAR Coordinator

coordinator@separ.ca

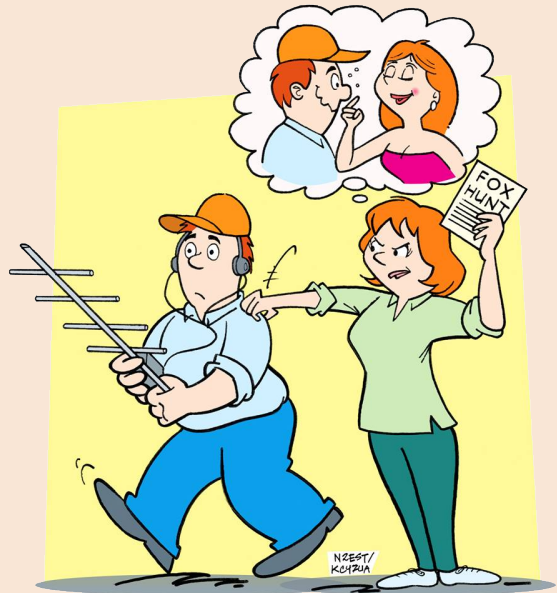
Don't forget our FoxHunt on May 16!

Everyone is welcome and you do not require an Amateur Radio certificate as it is receive only.

This is a real family event and we have had kids as young as 5 participate.

Registration starts at 9AM at the Crescent Park Picnic Area in south Surrey and the hunt runs from 10AM until noon. After the hunt a barbecue and some social time.

Please RSVP via jamesadf77@gmail.com for the barbecue so that we can accommodate the appropriate number of guests.





CW or Morse code?

Unpacking the FAA's Boeing 787 Transponder Directive

by JOHN SCHOUTEN VE7TI

I read a lot of blogs, club websites and other sources of amateur radio news. This one particularly caught my eye.

The source

<https://www.paddleyourownkanoo.com/2026/03/14/ham-radio-enthusiasts-land-u-s-airlines-with-8-million-bill-to-fix-faulty-equipment-on-boeing-787s/>

The 'click-bait' headline:

Ham Radio Enthusiasts Land US Airlines With 8 Million Bill To Fix Faulty Equipment On Boeing 787s

Ham radio enthusiasts could be partly responsible for landing U.S. airlines with an \$8 million bill to fix faulty equipment on Boeing 787 Dreamliner airplanes after it was discovered that simple radio signals can knock out a faulty transponder on the popular widebody plane used by American, United, and Alaska Airlines.

The issue came to light after the Federal Aviation Administration (FAA) reported "multiple instances of loss of transponder for airplanes entering airspace in the presence of CW interference."

CW interference refers to continuous-wave radio signals like Morse code, military transmitters, and even amateur ham radio signals, which could interfere with the transponder on some Boeing 787s...

When I saw this story it didn't seem to add up. After all, Amateurs have been sending CW for a century and there has never been an allegation such as this. Although my own and other readers' feedback has resulted in an adjustment of the original deceptive headline, the underlying story deserved further investigation.

The actual facts

When the FAA warns of "CW interference," hams think of Morse code. Aviation engineers think of something far more dangerous—a silent, invisible wall of noise that can blind a Dreamliner to oncoming traffic.

In the world of amateur radio, "CW" is a beloved mode—the rhythmic cadence of



Morse code cutting through the static, a testament to communication's simplest form. But when the Federal Aviation Administration (FAA) uses the same two-letter abbreviation in an airworthiness directive, it is describing something far more insidious and utterly unrelated to the operator in the shack.

For an avionics engineer, "Continuous Wave (CW) interference" refers to a pure, unmodulated, single-frequency carrier signal that has no business being where it is. It is a rogue tone, a sustained note of radio energy that can overwhelm sensitive aircraft receivers. And according to a new Notice of Proposed Rulemaking (NPRM) from the FAA, this type of interference is posing a direct threat to the Boeing 787 Dreamliner's ability to see and be seen by other aircraft.

The proposed directive, <https://www.federalregister.gov/documents/2025/06/13/2025-10759/airworthiness-directives-the-boeing-company-airplanes> which would affect 150 U.S.-registered 787-8, -9, and -10 aircraft, mandates a costly hardware replacement to fix a vulnerability that could, quite literally, render an aircraft invisible in busy airspace. But what exactly is this interference, and why is a simple hardware swap estimated to cost U.S. operators nearly \$8 million?

The Problem: A Transponder That Won't Talk Back

At the heart of the issue is the 787's Integrated Surveillance System Processor Unit (ISSPU), a critical component that manages the aircraft's transponder. The transponder's job is to listen for interrogations from Air Traffic Control radar and other aircraft's Traffic Alert and Collision Avoidance Systems (TCAS) on 1030 MHz, and reply on 1090 MHz. Note that this is far from the usual HF frequencies that Amateurs normally operate at.

According to the FAA directive (Docket No. FAA-2025-0924), multiple reports have surfaced of 787s entering airspace with active "CW interference" and suffering a specific, dangerous failure: the transponder stops meeting its Minimum Operational Performance Standards (MOPS). Instead of correctly replying to at least

90% of interrogations, the unit becomes desensitized, failing to respond.

This is not a gradual degradation. It is an "unannounced" loss, meaning the pilots receive no warning light, no aural alert, no indication that their aircraft is no longer replying to ground radar or TCAS inquiries. The first sign of trouble could be a gap in the sky where an airliner used to be, visible to everyone except the pilots of the aircraft that just went silent.

"CW" for the Layman: Not Morse Code, But a Wall of Noise

This is where clarification for the broader technical community is essential. For the amateur radio operator, "CW" (Continuous Wave) is synonymous with Morse code—a carrier wave that is turned on and off to form characters. It is intermittent, intentional, and communicative.

The "CW interference" cited by the FAA is something else entirely. In engineering terms, a "continuous wave" simply means a steady, unmodulated carrier signal. Think of it less as a conversation and more as a sustained, single-frequency tone—a pure, unbroken note of radio energy. If a pulsed radar signal is like a strobe light, CW interference is a laser pointer held steadily on a sensor, blinding it.

For a transponder receiver trying to pick out weak interrogation pulses from the sky, a powerful CW signal on or near its operating frequency (1030 or 1090 MHz) acts as a "jammer." It raises the noise floor, drowning out the very signals it needs to hear.

The Hunt for the Source: Who Is Generating This Noise?

The FAA directive is notably silent on the source of this interference, focusing instead on fixing the aircraft's vulnerability to it. So, who or what is generating these rogue continuous wave signals? The answer is complex and points to a crowded, modern radio spectrum. While the public document does not specify frequencies, the affected systems point squarely at the 1030/1090 MHz bands. Likely culprits for high-



power CW interference in or near these frequencies include:

- **Ground-Based Military and Civilian Radars:** Some radar systems, particularly those used for long-range surveillance or specific military applications, can produce strong continuous or quasi-continuous output that generates harmonics or spurious emissions.
- **High-Power Data Links:** Terrestrial microwave data links, used for point-to-point communication by telecom companies and utilities, operate in frequency bands that can, with faulty equipment, generate out-of-band emissions that bleed into the aviation surveillance bands.
- **The 5G Debate, Revisited:** The recent spectrum battles between aviation and 5G carriers centered on the potential for signals from powerful ground-based transmitters to cause interference with radar altimeters. While that specific fight involved different frequencies (3.7-3.98 GHz), it perfectly illustrates the principle: a powerful, continuous transmission on a nearby frequency can overwhelm aircraft receivers if filtering and shielding are insufficient.

The \$7.95 Million Fix

Because the sources of interference are myriad and largely outside an airframer's control, Boeing and the FAA have chosen to harden the aircraft itself. The proposed solution is not a software tweak, but a physical replacement of the vulnerable hardware.

While the issue is a worldwide problem, the directive would require US based operators to replace the left and right ISSPU units, swapping out current part numbers (822-2120-101 and -102) with a new, presumably better-shielded or more selective unit (part number 822-2120-113). The FAA estimates the parts alone will cost \$52,661 per aircraft. With labor, each of the 150 affected U.S. planes will incur a \$53,001 expense, bringing the total for U.S. carriers to \$7,950,150.

This is a significant investment for a problem that many in the industry suspect is not going away. As the radio spectrum grows ever more congested with diverse signals, the threat of "CW interference"—in its true engineering sense—will only increase. For the pilots of the Dreamliner, this hardware upgrade can't come soon enough. For the amateur radio operator tuning up on 40 meters, rest assured: your key is not the culprit. The real threat is coming from elsewhere in the increasingly noisy radio spectrum we all share.

73,

~John VE7TI



HAM LEFTOVERS...

An AI That Talks on Ham Radio

SV1TSD built Voxy — an open-source AI voice gateway for amateur radio. Speak into your Baofeng or any VOX-capable HT, and an AI answers you back over the air in real time. <https://youtu.be/QFPS-hpDcc8>

Why I think the Icom IC-7300 is the best POTA ham radio rig!

N7RAJ takes you on a deep dive into the iCOM IC-7300 radio and gives you his thoughts and opinions on the rig while out on a POTA activation. <https://youtu.be/KEb6rYAFB4Y>

Quansheng Remote Dock on Linux - UV-K5 - Internet Demo

This is a video demonstrating the Quansheng Remote Dock in practice on Linux. The developer goes through a practical demonstration. <https://youtu.be/fTkYQWV1-E?t=42>

Ham Clock CYD

This project implements an Amateur radio operator-oriented clock intended to help in the Ham shack or portable operations. The goal was to make a stand-alone device that could operate even if the internet is not available. There are some other excellent browser-based solutions available that do a fine job but require the internet to operate.

<https://hackaday.io/project/205225-ham-clock-cyd>

KJ4WLC Ham Dashboard — Real-Time Amateur Radio Data

An all-in-one amateur radio dashboard in your browser: <https://hamradio.shaneburrell.com/>

A Radio Power Amplifier For Not A Lot

Inspired by a circuit from [\[Harry Lythall\]](#), the prototype is built on a piece of perfboard. Here is a QRP PA that delivers about a watt from 1 to 30 MHz, made from readily available parts, and costs very little. <https://hackaday.com/2026/03/11/a-radio-power-amplifier-for-not-a-lot/>

A look back...

at The Communicator—June 2016

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2025-2026

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Read it [here](#)

Past Communicators are available at:
[Past Communicator Issues](#)

or search the complete Communicator contents & index at:
[SARCindex](#)

May and June

Down The Log...

For the May general meeting, Stephen Little VE7LWD will introduce the RMS Field Gateway – a purpose-built appliance for Winlink RMS Packet operation on VHF/UHF based on Direwolf and LinBPQ. The session will cover common challenges with existing gateway deployments, including operation with and without internet connectivity, with messages stored locally for RF retrieval or automatic forwarding when connectivity returns. A live demonstration will show the system in operation, followed by time for questions.”

June is the month for our Annual General Meeting and SARC members will find the AGM attachment at the end of this Communicator. Four Director positions will be on the ballot. Your vote is important so try to be there or, at the very least, give another member your proxy vote.

On the Web ve7sar.net

Between Communicators, watch your e-mail for news, announcements of Amateur Radio events, monthly meetings and training opportunities.

Click the links below to follow our presence on the web and social media:

SARC Blog
ve7sar.blogspot.ca

Bluesky (No more 'X')
[#ve7sar.bsky.social](https://www.bsky.social/#ve7sar.bsky.social)

FaceBook
[SurreyAmateurRadio](https://www.facebook.com/SurreyAmateurRadio)

Our YouTube Channel
[SurreyARC](https://www.youtube.com/SurreyARC)

Weekly Tuesday Evening SARC and SEPAR Nets

Join the SEPAR net every Tuesday at 7:30 pm and the SARC net at 8 pm on either of the repeaters: North repeater on 147.360 MHz +600 KHz, tone 110.9 Hz and South repeater on 147.360 MHz + 600 KHz, tone 103.5 Hz. You can also join via IRLP (node 1736) and Echolink (node 496228) which are available only on the North repeater.

Monthly 220 MHz Net

The 220 Net has moved to the last Thursday of each month at 7:30 pm on our 220 repeater at 223.960 -1.6 MHz, tone 110.9 Hz. This is not a "chat" net – just check in and exchange signal reports.

Monthly UHF Net

Darryl VA7CQD hosts a monthly UHF net held at 7:30 pm on the first Sunday of each month on SARC's UHF repeater 443.775 MHz+5 MHz tone 110.9 Hz. This is a non-chat net; just check in and carry on with your evening.

SARC Monthly Meetings

2nd Wed. (Sept-Jun)
1900 hrs at the [Surrey Fire Service Training Centre](http://www.surreyfire.ca),
14923 - 64 Avenue,
Surrey, BC.

Here is a what3words link and map: <https://what3words.com/markers.addiction.ozone>

Weekly SARC Social

Saturday between 0730 and 0930 hrs at the Denny's Restaurant, 6850 King George Blvd., Surrey BC

Workshops

Saturday between 1000 and Noon at the OTC
5756 142 Street, Surrey

SEPAR Net

Tuesday at 1930 hrs local

SARC Net

Tuesday at 2000 hrs local

VE7RSC Repeaters

2m North: 147.360MHz+
Tone=110.9Hz
IRLP node 1736
Echolink node 496228

2m South: 147.360MHz+
Tone=103.5Hz Fusion
capable; No IRLP/EchoLink

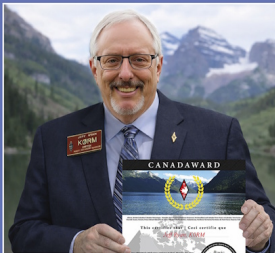
1.2m: 223.960 Mhz -1.6
Tone=110.9Hz

70cm: 443.775MHz+
Tone= 110.9Hz
IRLP node 1737
WiRES-X Room ID 00047

Canada's
Amateur Radio
Magazine
La Revue des
Radioamateurs
Canadiens

THE CANADIAN AMATEUR

MAY / JUNE 2026 – MAI / JUIN 2026



The Importance of
Getting On The Air!



Publications Mail Agreement # 40038492 Registration # C09846



The Canadian Amateur (TCA),

Canada's premiere national magazine devoted to Amateur Radio, is published six times per year and is the membership journal of the Radio Amateurs of Canada (RAC). It is available in both print and digital versions (eTCA). Members of RAC, Canada's sole national Amateur Radio organization, receive TCA automatically.

A subscription to TCA also provides membership in Radio Amateurs of Canada. RAC is also the publisher of TCA. For information on how to join Radio Amateurs of Canada and subscribe to TCA please visit our [Membership Sign Up page](#).

At 64-pages per issue and reaching approximately 4,500 readers, TCA offers news and views on the Canadian Amateur Radio scene from coast to coast to coast. It includes regular columns, features and technical articles of interest to Amateur Radio operators. In addition, a Coming Events calendar, Feedback, QSL Bureau information and coverage of regulatory issues are also provided.

If you would like additional information about The Canadian Amateur magazine please contact the Editor Alan Griffin at tcamag@yahoo.ca.

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